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AUTOMATION

Special Editor of this Volume

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Labor and Industrial Relations
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FOREWORD

The word "automation" entered the language about a dozen years ago. It immediately caught the public fancy, and, today, the popular media of communication carry what is undoubtedly a surfeit of description and speculation on automation. The public seems to have embraced the term with more enthusiasm than clarity of understanding. In some contexts, automation seems to be used to mean anything that causes displacement—or unemployment—of labor; in other contexts, the term seems to be synonymous with technological change; and, at another extreme, some popular writers seem to assume that "true" automation necessarily involves only something fuzzily identified as electronics.

This variety of usage has stimulated great controversy regarding the effects of automation. One line of thought has been that basically there is nothing new about automation, that it is simply technological change under another name, that we know all about such change, and that historically our economy has always automatically solved any problems of adjustment that have arisen. An opposed line of thought has been that automation is fundamentally different from what we have known as technological change in the past, that automation is the application of a number of all-but-incredible scientific breakthroughs in recent years, and that automation and other scientific developments—such as nuclear weapons—have turned our society in new directions and have imposed entirely new requirements on it.

In this symposium, scientists, engineers, social scientists, and spokesmen for management, labor, and government consider a variety of aspects of automation. The topics discussed necessarily represent a selection from a far larger number of important aspects of the subject, and each author undoubtedly would have found it far easier to write 50,000 words on his assigned topic than to limit his discussion to 4,000 or 5,000 words. This symposium is intended to be an introduction to the subject for the layman rather than a compendium for the expert.

It would be presumptuous to undertake to summarize the symposium because of the complexity of the subject matter and the diversity of viewpoints represented. Yet the symposium seems to justify certain broad conclusions.[1] Technology is composed of many strands, and one of them is mechanization. In the early years of the Industrial Revolution, the emphasis in mechanization was the substitution of inanimate energy sources for human or animal muscles. In more recent times, the emphasis in mechanization has been on devices that can perform more and more complex sequences of operations with less and less human assistance. The key to achieving this emphasis has been the development of mechanical substitutes not only for muscular energy but for other human faculties as well. Thus, mechanical equivalents for sensory organs have been invented; an example is the "electric eye." Designers long ago learned how to build a kind of "memory" into a complicated machine so that it could "remember" all of the details of a series of operations; gears, cams, and a variety of other mechanical linkages provided the means. Self-correcting, or automatically controlled, machines have a long lineage which includes Watt's flyball governor and the furnace thermostat.

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[1] It should be noted that at least some of the other authors might not agree with this formulation, and they should not be held responsible for it.

Machines to perform certain kinds of mental work, such as arithmetic calculations, have been used for many decades.

Significance of recent developments

Since World War II, rapid progress has been made in developing more adequate—indeed, in many respects, far superior—substitutes for human faculties. Measuring and other types of sensing instruments have become more sensitive and more versatile. Control devices have become more powerful and more reliable as well as more versatile. The electronic computer is probably the most significant postwar development in technology. The computer makes "lightning calculation" a realistic expression. We are only beginning to explore the extent to which computers can perform functions which are analogous to human thought processes. Already, however, we have found ways of communicating very large amounts of data to the computer, providing it with instructions for the manipulation of the data, and getting meaningful answers from it. We have also found ways of linking together measuring instruments, computers, and control devices to provide integrated, self-regulating systems which are capable of performing extremely complicated operations with little or no human assistance. These developments have suggested to me the following definition of automation: it is the mechanization of sensory, thought, and control processes.

It is already apparent that the basic techniques of automation are applicable to an extremely broad range of activities, including as examples petroleum refining, chemical processing, steel rolling, preparation of payrolls, accounting, language translation, airplane navigation, medical diagnosis, and many others. We have found that many kinds of decisions which up to now were thought to require human judgment can be reduced to clear-cut rules which the computer can apply more accurately and far more rapidly than humans. It seems justifiable to suggest, as some authors in this volume imply, that we have again reached a point in technological development where fundamental changes in the relationship between men and machines are taking place.

A basic effect

Discussion of the effects of automation is complicated by the facts that many analysts disagree concerning the definition of the term and that, in any event, it is often quite difficult to establish either the presence or the absence of clear cause and effect relationships in complex modern societies. The reader will find that the disagreement and uncertainty resulting from such complications are reflected in this volume. Yet there seems to be a reasonable degree of consensus on one point: one basic effect of current technology is to increase the need of society for people with substantial education and training and to reduce the work opportunities for those who lack such education and training.

In earlier years, millions of jobs could be learned in a matter of hours or days. The holders of such jobs needed little more than the ability to guide materials into and out of machines, to watch gauges, to flip levers, to push buttons, to hear or see signals, to write numbers in ledgers, to make simple decisions, and so on—plus the stoicism to endure the monotony of endless repetition. Such simple, repetitive jobs are the ones most easily taken over by machines. To be sure, these simple jobs have not disappeared, and no doubt some will survive indefinitely; but the number of such jobs has certainly fallen far below the number of poorly educated, untrained members of the labor force who cannot qualify for more demanding jobs.

To put the matter succinctly, automation tends to strengthen the demand for labor at the higher levels of skill and knowledge while weakening the demand at the lowest levels. Our institutional framework has not yet been accommodated to this basic shift in the structure of demand for labor. We are producing far too few people at the higher skill levels and far too many who can offer in the market place little more than their untutored five senses. This incongruity between the skill structure of demand for labor and the skill structure of labor supply seems to be one of the causes of the current unemployment problem. It is fatuous to assume that this incongruity is self-correcting. I strongly doubt that a general increase in economic activity, or "economic growth," will by itself entirely eliminate the incongruity. In my judgment, as a nation we are scarcely aware of the existence of this problem and we have as yet no comprehension of the magnitude of the effort required at all levels of education and training to meet it.

This, I believe, is the most urgent task set for us by automation: to identify the kinds of work that the human is still capable of performing better than our new automatic machines, to analyze the skills needed for that work and the best methods of acquiring them, and then to educate and re-educate, train and retrain the present and future members of the labor force so that they will have the capacity to be fully productive members of society under the new conditions laid down for us by automation.

CHARLES C. KILLINGSWORTH

The Intellectual Foundations of Automation

By J. F. Reintjes

Abstract: Modern automation makes use of machines which are capable of simulating, in some measure, the human neuromuscular system and, to some extent, the human psychoneuromuscular system. These machines are the culmination of man's continual effort throughout the centuries to develop mechanical aids which would conserve and supplement his personal energy, both physical and mental. In the early stages of civilization these aids took the form of hand implements and simple machines which served to maximize the effectiveness of man's personal strength. The development of power machinery during the eighteenth century represented a major break with the past in that it enabled exploitation of the energy latent in nature and released man from the task of being the prime energy source in the performance of his work. Modern technology has brought about additional progress in the evolution of machines. Through the concept of feedback control, electronic-computer techniques, and combinations of these, machines have been evolved which can perform selected tasks by themselves in accordance with commands furnished to them. In some applications, these machines can outperform humans. In others, they are able to take over simple decision-making functions from humans and to analyze automatically massive quantities of data.

J. F. Reintjes, M.E.E., Cambridge, Massachusetts, is Professor of Electrical Engineering and Director of the Electronic Systems Laboratory at the Massachusetts Institute of Technology. He has also served as a faculty member at Manhattan College and as an engineer with the General Motors Corporation and the General Electric Company. He is a coauthor of a textbook on Principles of Radar and author of many papers on electronics, computers, automation, and engineering education.

MAN, since his beginning, has put forth a continual effort to make easier the procurement of material goods which are essential for his survival and which contribute to his personal comfort, well-being, and enjoyment. Throughout the ages he has used his ingenuity and capitalized on his heritage of accumulated knowledge to invent, fabricate, and improve contrivances which aid him in his quest for the basics for living—food and protection from natural and self-appointed enemies—and for the added abundances which characterize the cultural and sociological patterns of his time.

Personal energy

Primitive man has left behind many examples of the implements he devised to sustain his livelihood. Clumsily fashioned first from stone and later from metals, these artifacts were principally tools and weapons which he used to procure sustenance and shelter. As civilizations progressed, these implements were repeatedly refined and made more elaborate in order that they would be more effective for their purpose. The crude stone ax gradually evolved into a well-polished and sharpened knife; the hand-thrown arrow was superseded by the spring-action bow and arrow. Collectively, these and all the devices which characterize early civilizations had certain features in common: They depended for their effectiveness upon the personal energy of the user, and they were designed so that the personal energy imparted to them was strategically concentrated in a manner which enabled them to accomplish their purpose. Thus, designs took the form of a sharp cutting edge, as in the ax and knife blade, or the shape of a needle-like spear, as in the arrow.

As man became more advanced, he became interested in devices which would conserve his personal energy and thus enable him to control its release at a rate more in keeping with his physical ability to regenerate personal energy. This interest led to the development of simple machines—such as the lever, inclined plane, wheel and axle, and the pulley—devices which enabled him to trade time for the opportunity to expend his energy at a lower rate. Through these devices he was now able to achieve a mechanical advantage, a capability which allowed him to put forth for long periods a sustained effort on tasks which would otherwise overtax his strength.

For thousands of years, man exploited his past and devised many ingenious and increasingly complex methods of harnessing, controlling, and releasing personal energy. As the occasion demanded, he found ways to combine his mental powers with muscular energy to yield manual dexterity and skills. To gain mobility at sea, for example, oar-propelled ships were built—first with a few sets, later with many sets arranged in double banks—and crews were taught to operate these in unison to give remarkable propulsion power. Writing, as a means of preserving and communicating information, was invented, and mechanisms for performing it were continually improved. In the realm of manual skills, pottery making, hand weaving, glassmaking, and building techniques were developed and refined to a high degree by succeeding generations.

Inevitably, the demands for goods to satisfy the trade and commerce which these advancements brought about created need for new methods of manufacturing and new ways of organizing people who produced the goods. An essential requirement was a new source of energy which could augment or supplant personal energy. Although use of domesticated draft animals and the harnessing of water power supplied this need in a crude way for centuries, it was not until the seventeenth and early eighteenth centuries, when certain key inventions and technological advancements came along, that it became possible to exploit the latent energy found in nature in a major way. In fact, the substitution of fossil fuels as an energy source for personal energy represented a major break with the past and brought about a series of interrelated events which, taken together, set the stage for the eighteenth-century Industrial Revolution.

INFLUENCE OF POWER MACHINERY

Power machinery driven by the energy from fossil fuels characterizes the industrial scene of the eighteenth century. Introduction of this machinery interposed a revolutionary device between the worker and his workpiece and, in consequence, brought about drastic changes not only in his work habits but in his whole mode of living. For the first time he was concerned not so much with the control and release of his own energy as with the manipulation of mechanical devices which governed the release of energy by machines whose power was derived from outside sources. His productivity became more directly a function of his physical dexterity in controlling machines than of his physical endurance. His effectiveness as a worker passed beyond the stage of being personal-energy limited and entered the stage of being personal-skill limited.

The factory system of grouping workers together evolved from this new technology. Although workshops existed in ancient and medieval times, they consisted mostly of informal groups of people working independently, with occasional sharing of hand tools. The need for appreciable capital to defray power-machine costs resulted in a new approach to manufacturing, with factory owners providing the machines and workers providing the operating skills.

The prime inventions and discoveries which contributed to the eighteenth-century upsurge in the use of machines were those which made possible the exploitation of fossil fuels as an energy source. Noteworthy are the invention of the steam engine and several important refinements in metallurgical processes which yielded metals with the physical properties required in the fabrication of high-power machinery and machine tools. With power sources and structural metal thus assured, machinery of all kinds made its appearance in factories. Although power-driven tools for metal removal came into being at this time, it was largely upon textile manufacturing that machines made their greatest impact, first during the eighteenth century in Europe and later during the nineteenth century in this country. Quite interestingly, this industry seems to be relatively uninfluenced by the twentieth-century technological progress which has served to inspire modern automation.

Forerunners of present-day automatic-control and data-processing devices came into being during the eighteenth century. Included on a steam engine of James Watt was an automatic-control device for maintaining constant engine speed. The flyball governor was a mechanical device which rotated at a speed proportioned to that of the engine. It was attached to the steam throttle. Whenever the engine speed increased, centrifugal force caused revolving balls to move outward and, in so doing, to throttle the engine, thus reducing speed. A decrease in speed caused the opposite effect—additional steam would be injected and the engine would speed up. Continuous speed control was thus obtained automatically.

During this period, also, the French mechanical engineer, Jacquard, introduced a completely automatic loom for weaving patterns in cloth. In this loom, weaving instructions were supplied on a series of punched cards, and the various motions of the machine were carried out automatically in accordance with the previously prepared instructions.

BASE OF MODERN TECHNOLOGY

Whereas eighteenth- and nineteenth-century technological progress had its roots mainly in mechanical innovation, modern technology is built upon a much broader base and stems from widespread advancements in the physical, mathematical, chemical, and electrical sciences, as well as from the exploitation of these advancements by the various engineering disciplines. The prelude to modern technology was the discovery of electricity. The enormity of this newfound force of nature became recognizable once it was realized that electricity is inherent in the structure of all matter and that matter and energy are, in fact, related. In rapid succession, there followed a myriad of events which served to expand many times over our store of scientific knowledge and engineering skills. Techniques for generating and distributing electric power in large blocks were developed, and ways were found to convert it back and forth among electrical, mechanical, and chemical forms. Ability to communicate with many people at remote distances was made possible first through the telegraph and later through the telephone, a device that figures importantly in every discussion of automation. The invention of the vacuum tube not only helped to put communication on a global basis but also created a component which is common to many types of devices used in automation. With the advent of the automobile, the mobility of people on land was no longer limited by the extent of their physical endurance nor that of their domesticated animals. The invention of heavier-than-air craft further increased the speed of mobility nearly tenfold. A new kind of fuel was demanded for autos and aircraft, however, and, thus, impetus was given to the development of petrochemical refining processes.

But, if the scientific progress of the past several decades has made automation technically feasible, the economic and social patterns and pressures which this progress has brought about have largely created the need for it. As in all other stages of man's cultural and social development, the availability of modern devices, goods, and services which add to his personal well-being has generated intense demand for these things, and they in turn have motivated him to search for new ways to fulfill the demand. Automation is one manifestation of this search.

Originally coined to describe the production lines in the automobile industry, the term automation has gradually assumed broader significance and is now applied to almost any device which reduces the amount of human effort—physical and mental—required to do a job. One aspect of automation is aimed at continuous automatic or semiautomatic production and makes use of an integrated set of machines which permits a product to proceed through various stages of manufacture with a minimum amount of assistance and handling from human operators. An example of this form of automation is the set of machines which perform the various broaching, drilling, boring, and milling operations on automobile engine blocks, transport the blocks automatically from machine to machine in proper sequence, check tolerances, and stop the entire process if faulty operation is detected. Another example is an automatic-assembly machine which places the various electrical components of a radio or television receiver in their proper place on a printed-wire board and then solders the components in place.

APPLICABILITY OF AUTOMATIC-PRODUCTION MACHINERY

Mechanization of this kind is particularly suited to manufacturing operations which are repetitive and not subject to modification over large production runs. Since continuous automatic-production equipment necessitates an appreciable outlay of capital, it is most frequently employed in the manufacture of products for which there is a strong replacement market and in those industries which stand a good chance of profiting from their investment before product obsolescence or market saturation sets in. Bread making, electric-lamp fabrication, and cigarette manufacturing are illustrative of processes which meet these criteria almost to the letter. It is noteworthy that, in the case of cigarette manufacturing, the applicability of continuous automatic manufacturing equipment was recognized years ago, and cigarette manufacturers employed automation long before the word was invented. Each day, millions of cigarettes are manufactured, about the same number are consumed, and, in the past half century, really only two product-design changes have been made—one in length, the other through addition of a filter tip. Specific kinds of service which have to be performed repetitively in accordance with established rules are also appropriate for mechanization. As an illustration, the telephone companies make extensive use of mechanization in order to provide the quality, speed, and scope of service which are expected by their customers.

Feedback control

Technologically, automation draws upon a broad spectrum of tools and techniques in our present store of engineering skills, but concepts which evolved from the great scientific effort put forth during World War II are contributing to the more spectacular aspects of the subject. One of these concepts is feedback control. This type of control is accomplished by feeding back either continuously or intermittently part of the output, or response, signal of a system so that a comparison of it can be made with the input, or command, signal. Should an error exist, a signal is generated automatically which tends to reduce the error to zero. Prior to 1940, feedback control was of a relatively elementary kind, and usually a human being was included in the feedback system. In the control of chemical and metallurgical processes, for example, it was common practice, and in some instances it still is, to have human operators read instruments—pressure gauges, thermometers, pyrometers, and so forth—and to make adjustments manually in order to correct observed errors. In this arrangement the operator's eyes serve as an error detector, his brain is used first to compare observed readings with the correct ones stored in his mind and then to give a signal to his muscles which enable him to turn controls so as to minimize the error. Feedback-control technology enables this error-correcting procedure, and many others of a similar nature, to be carried out continually and automatically through use of machines.

Feedback constitutes the heart of a class of automatic-control devices called servomechanisms. The distinguishing features of a servomechanism are the various circuits which enable signals to be fed back from one part of the device to another for comparison and error-correcting purposes and the ability of the device to amplify power. Command signals are supplied to a servomechanism at a low power level, and these commands cause a high power mechanism, such as an electric, hydraulic, or pneumatic motor, to respond automatically in accordance with the commands. The ratio of the power controlled to the power in the controlling signal may often be a million to one. Thus, by supplying low-power command signals to servomechanisms attached to the bedplate and cross slides of a power machine tool, a milling machine for example, it is possible to control the motions of the machine without human intervention.

IMPACT OF FEEDBACK CONTROL

Feedback-control technology has added a new dimension to automation in that it permits design of control mechanisms which are electromechanical analogues of the human neuromuscular system. In fact, servomechanisms might well be thought of as mechanical muscles which are under control of sensing instruments and uniquely arranged circuitry that perform essentially the same functions as the human nerve system. Because the manipulative ability of the human is sluggish, servomechanisms are excellent replacements in control operations which call for precision and fast reaction time. Also, because the human is limited in the number of devices he can control simultaneously, servomechanisms can readily accomplish control in situations where the number of elements to be controlled are too numerous for a human operator to cope with. More specifically, in a manual-tracking operation which requires a person to manipulate a handle in order to keep a pointer aligned with another which is moving in a random manner, it has been determined that the human can follow random motions satisfactorily provided the highest frequency involved is no greater than one or two cycles per second. Servomechanisms can easily be built to increase this speed of response at least fiftyfold.

Equal in importance to feedback control as a contributor to automation has been the evolution of the electronic computer. Extensive development work on computers was conducted during World War II. Their purpose was mainly to assist in pointing guns and bringing fire power to bear against targets. Data about the range, bearing, and elevation of a target in space were fed to the computer, together with information concerning target velocity, projectile ballistics, wind behavior, and so on. From manipulation of these data, signals were derived which could be used for the proper training of guns. These computers were of the analogue variety; that is, they performed mathematical operations by first generating electrical signals which were analogous, or proportional, to the various mathematical functions that were to be manipulated and by then applying these signals to electrical circuits which were capable of performing addition, subtraction, multiplication, integration, and so on. Electronic analogue computers are now being employed in the applications where high computational speed is not required and where errors of the order one hundredth of one per cent can be tolerated.

DIGITAL COMPUTERS

Just prior to and during World War II, mathematicians, engineers, and scientists also investigated the possibility of devising electronic computing machines whose central computational mechanism is based directly on numbers. From their efforts, there evolved the electronic digital computer, a machine which has greatly expanded the horizon for automatic data processing and computation. The characteristic features of digital computers are these: they have a memory in which large quantities of data can be stored in electrical form; they permit rapid access to stored data; they are able to manipulate data and to carry out mathematical computations at a high speed.

In performing their computational operations, digital computers make use of short bursts of electrical signals, called pulses. Each pulse persists for only a fraction of a microsecond (a microsecond is one millionth of a second), and number representations are formed by establishing patterns of pulses, coded in accordance with the principles of a number system. Because electronic circuits with two stable states (an "on" state and an "off" state) are easy to build and simple, digital computers operate in the base 2, or binary number system, rather than in the decimal system. Mathematical operations are carried out by manipulating the pulses in accordance with the rules of the number system.

Although the capabilities of these machines are being expanded almost monthly, it is possible to illustrate the general order of magnitude of the storage, access time, and computational speeds of representative machines now in operation. If it is assumed that this volume of THE ANNALS contains a total of 65,000 words and that the average length of the word is six characters (five letters plus a space), machines now in industrial use can store at least one half of this volume. With machines under development, storage of the entire volume is possible, and the trend in storage capacity is steadily upward. Present machines are also able to gain access to any stored word in about ten microseconds and can perform of the order of 100,000 additions per second. In the near future, the arithmetic-addition capability of machines will be more nearly a million per second.

Digital computers are quickening the tempo of research through their ability to provide quantitative solutions to highly complicated and complex mathematical problems. Thus, they are serving as a major contributor to our scientific growth and expansion. In addition, their memory, fast access to stored data, and computational features are making possible the automation of a host of routine, repetitive-type industrial and office procedures such as payroll computation, inventory and production control, accounting, and sales forecasting. These machines are obvious candidates for continued or future employment in banks for the processing of checks and accounts; in insurance companies for premium billing, accounting, and actuarial forecasting; in airline offices for quick ticketing and answers to queries on availability of seating space; in libraries for the automatic retrieval of information; in government service for making patent searches, the processing and checking of income-tax returns, statistical analyses, and processing social security data; and in practically any endeavor that processes, analyzes, or otherwise operates on large masses of data repetitively in accordance with a fixed pattern—and that can justify the capital outlay.

TAPE-CONTROLLED MACHINES

With the availability of feedback-control systems which simulate the human neuromuscular system and electronic computers to carry out decision-making and data processing, it is only natural that engineers have merged computers and control into the equivalent of a psychoneuromuscular system. These machines are known as digitally, or numerically, controlled machines, or simply as tape-controlled machines. The latter term is an appropriate description, since commands that govern machine behavior are supplied in the form of coded numbers which appear as patterns of holes on paper tape or as patterns of magnetic-field intensities on magnetic tape. The taped information is fed to a digital data-processing machine which translates the code into electrical signals suitable for controlling servomechanisms. These servomechanisms in turn cause the machines to which they are connected to execute the motions or operations called for on the input tape. Thus, machines of this kind function automatically under direction of instructions prepared in advance by an operator who is not necessarily at the machine location.

Tape control is most attractive for use with individual machine tools, particularly the metal-cutting varieties—milling machines, lathes, jig borers, and similar machines which cut either along continuous paths or at discrete positions. In a sense, they complement the interconnected mass-production machinery and materials handling equipment previously discussed. In contrast to mass-production machines which are inflexible and best suited to manufacture a single-style item, tape-controlled machine tools are flexible and easily adaptable to assorted job requirements. They are uniquely suited for carving complicated parts from metal where frequent changes in motion are required along all machine axes simultaneously.

MAN-MACHINE INTEGRATION

It should be evident, therefore, that modern technology has contributed heavily to the evolutionary progress of machinery. Not only can machines now serve as replacements for man's muscular energy, but they can also simulate in small measure his nerve system and imitate, however crudely, some of his mental powers. In certain situations, chemical-process control being one, where highly agile manipulative dexterity must be combined with mathematical operations, machines can outperform humans. But the challenge resides not in machines as replacements for humans but in determining how men and machines can work together to yield an over-all system more effective than either when acting alone. Man-machine integration ignores full use of machines to the exclusion of human beings and seeks, rather, to make critical appraisals of the capabilities of each in order to derive maximum effectiveness from their combination.

Man-machine integration offers interesting opportunities for the future, and progress in specific situations is already being made. As an illustration, in the tape-controlled machine-tool field, the time-consuming job is the programing of the machines; that is, in the preparation of the great many coded instructions which are needed to complete the entire workpiece. These instructions define, in effect, the road map for the cutting tool. But many calculations enter into the determination of this road map, including allowance for cutter speed, cutter size, the type of cutting tool, the hardness of the metal being machined and, of course, precise statements about the various motions which take place along each axis of the machine. In the early stages of development of tape control, programing was carried out manually with the aid of desk calculators. More recently, methods have been devised so that large general-purpose computers can take over many of the calculations, thereby assisting the programmer in reducing the amount of time consumed in programing.

The next logical step for the future in tape-controlled machine manufacturing is at the design stage itself. Here a computer offers an interesting possibility to the designer as a partner in his job of creating a mechanical part to perform a specified function. Within our present primitive understanding of digital machines, it is conceivable that even now the tasks of making routine calculations such as stress analyses on trial shapes and of selecting materials capable of meeting various specifications on weight, kinds of materials, and expansion tolerances can be delegated to computers. But the more interesting challenge lies in the possibility of using computers to assist in the creative-design process itself. Much remains to be understood about the technology of computers, their use, and their relationship to the human operator before this will come to pass.

During the next few decades the work of researchers in machine technology will be motivated by the exciting possibilities for machines which can learn, possess the power of judgment, and assume properties of artificial intelligence. In their search for ways to build these machines, researchers will naturally turn to the human psychoneuromuscular system for clues. Succeeding levels of sophistication in machines will likely depend, in large measure, upon our ability to understand how the human accepts data, stores, processes, and releases it, and how he recognizes and manipulates patterns of information in order to develop powers of thought and expression.

Artificial Intelligence: A Frontier of Automation

By ARTHUR L. SAMUEL

ABSTRACT: Artificial intelligence is neither a myth nor a threat to man. It relates to a serious attempt to develop machine methods for dealing with some of the perplexing problems that should, in all justice, be delegated to machines but which now seem to require the exercise of human intelligence. Two fundamentally different approaches to the problem are being explored, the one aimed at a complete understanding of the intellectual processes involved and the other aimed at duplicating the assumed specific behavior of the brain. The first approach concerns itself with such matters as search, pattern recognition, learning, planning, and induction; the second approach involves a study of the behavior of random nets. It is fair to conclude that artificial intelligence promises to reduce rather than to augment technological unemployment.

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ARTIFICIAL intelligence is an apparently self-evident phrase which has come into common usage without having a well-defined and generally accepted meaning. Unfortunately, this term also carries with it certain anthropomorphical implications which tend to arouse emotional responses on the part of the reader that have little or no bearing on the actual state of affairs. To some people, the concept of artificial intelligence is a scientific aberration defined as the Myth of Thinking Machines; to others, it relates to man's first stumbling attempts to develop machine methods for dealing with some of the perplexing problems that should, in all justice, be delegated to machines but which now seem to require the exercise of human intelligence; and, finally, to some easily frightened individuals, artificial intelligence refers to the impending danger of man's domination by the Machine. This divergence of opinion and of feelings, with respect to a subject that should be capable of scientific evaluation, bespeaks of a general lack of knowledge, which this discussion will attempt to correct.

As a matter of fact, a revolution is in the making with respect to the manner in which digital computers will be used to solve the problems of business and industry. This revolution has its beginnings in a variety of apparently unrelated research studies. Some of these studies seem to be directed toward quite uneconomic ends, such as programing * computers to match pennies, play tic-tac-toe, play checkers and chess, write poetry, compose music, and solve high school problems in plane geometry. Other studies are concerned with more practical problems—programing computers to read hand-sent telegraph signals, to recognize handwriting and speech, and to translate from Russian into English. Still others are concerned with learning machines, the mechanization of cognitive processes—yes, even with thinking machines. Some idea of the magnitude of the effort on these topics may be gained from the fact that a recently published bibliography[1] to the literature on artificial intelligence contained 559 references to individual papers by some 400 different authors and 26 additional references to symposia, proceedings, and other special collections concerning artificial intelligence, and this tabulation did not include mechanical translation, for which an earlier bibliography—1959—listed 645 papers. A large and growing body of workers, largely in the United States but with many members scattered throughout the civilized world, is attempting to write programs for existing machines or to design and build special machines all for the expressed purpose of performing tasks which, if done by human beings or by animals, would be described as involving some use of the intelligence. Regardless of our personal feelings as to the moral consequences of this form of automation, we cannot afford to ignore the revolutionary effect on our society which it portends.

ON THE FRINGE

As always, with any revolution, there is a lunatic fringe—people who believe in magic, or those who are carried away with their enthusiasm for a new cause and who make wild claims which tend to discredit the entire undertaking. The

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* Ed. note: Mr. Samuel has called attention to the fact that the spelling of the words "programing," and "programed" is now done with two *m*'s by everybody in the computing industry. Because we are following the spelling in *Webster's*, we apologize to the author for not adopting the practice.

[1] Marvin Minsky, "A Selected Bibliography to the Literature on Artificial Intelligence," *IRE Transactions on Human Factors in Electronics*, Vol. 2 (March 1961), pp. 39–55.

field of artificial intelligence has, perhaps, had more than its share of these people. Norbert Wiener, who certainly does not belong in this category, has, nevertheless, fostered some of the loose thinking by maintaining, as a basic tenet of cybernetics, that a rather complete analogy exists between control functions in men and in machines and by insisting that machines can possess originality and that they are a threat to mankind.[2] In a contrary vein, Mortimer Taube[3] of Columbia University discounts the entire field of activity and, in effect, charges the workers in the field with "writing science fiction to titillate the public and to make an easy dollar or a synthetic reputation." Can we cut through a morass of detail and this mishmash of conflicting claims and, somehow or other, identify the true nature of artificial intelligence and of the revolution which is upon us?

To simplify our task, we will have to be quite arbitrary and exclude certain usages of digital computers such, for example, as calculating the stresses in an airplane wing, or computing a payroll, even though these usages do reduce the amount of human thinking which must be done. In a sense, the human thinking in these situations is done in advance by the people who write the set of instructions—the "program," in computer jargon—which spell out the series of individual steps that are to be taken in the computational process.

RUN-OF-THE-MILL COMPUTING

Since even these commonplace uses may seem a bit mysterious to the uninitiated, we might pause for a moment and point out that a digital computer is, after all, only an inanimate assemblage of mechanical and electrical parts that functions in a completely mechanistic fashion. As Lady Lovelace remarked over a hundred years ago in describing Charles Babbage's Analytic Engine, nothing comes out of the computer which has not been put into it, barring, of course, an infrequent case of malfunctioning, and the computer can only do what we know how to instruct it to do.

The magic of the computer resides not in what it can do but only in the speed and accuracy with which it performs a sequence of very simple computational steps, a sequence which, as we have said, has been specified in advance by the person who wrote the program and which derives its complexity and its utility from the involved relationships existing between the individual steps. Let us characterize these commonplace uses of digital computers by the fact that the answers which the computer is called upon to produce are all derived from the input data by the application of a strict set of rules that are known and that have been written down in advance by the programmer. These rules may be strictly logical, as in scientific problems, or as illogical as our income-tax laws, but they are definite and woe be it to him who violates them. In a sense, we may say that the answers are all contained in the input data and that the computer's function is that of rearranging the input data in a more convenient form by the application of certain rules.

Programing a computer for such computations is, at best, a difficult task, not primarily because of any inherent complexity in the computer itself but, rather, because of the need to spell out every minute step of the process in the most exasperating detail. Computers, as any programmer will tell you, are giant morons, not giant brains. By way of contrast, when one assigns a computational task to a human assistant, one tells the assistant what to do; when one writes a computer program, he must, in effect, tell the computer how to do the problem. This distinction between how and what is far from trivial. It distinguishes the poor employee from the good one, and, to a much greater extent, it differentiates between the digital computer, as a very efficient but extremely dumb computing aid, and an intelligent human being.

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[2] Norbert Wiener, *Cybernetics; or, Control and Communication in the Animal and the Machine* (New York: John Wiley & Sons, 1948) and "Some Moral and Technical Consequences of Automation," *Science*, Vol. 131 (May 1960), p. 1355. See also Arthur L. Samuel, "Some Moral and Technical Consequences of Automation—A Refutation," *Science*, Vol. 132 (September 1960), p. 741.

[3] Mortimer Taube, *Computers and Common Sense—The Myth of Thinking Machines* (New York: Columbia University Press, 1961).

While the digital computer is a device for manipulating symbols of any kind, its genesis, as Allen Newell of Carnegie Institute of Technology has so aptly pointed out, lay in the desk calculator and in the business machine. Just as Babbage had earlier proposed, several innovations have been made to increase the usefulness of the device. In particular, three special types of units have been introduced in addition to the arithmetic unit. The first of these is the memory (more correctly, a storage unit) in which instructions and data can be retained until needed. Input and output devices are also added which enable the operator to introduce instructions and data into the machine and to obtain a record of the desired output. Finally, there is a central control unit which interprets the instructions one at a time and initiates three basic types of operations: moving information from one place to another, doing simple arithmetic, and transferring control to an instruction taken from one of two or more specified locations, depending upon a comparison that it makes between the signs or relative magnitude of specified numbers. These instructions are in the form of imperative statements, for example, move X to location A; add X to Y; skip an instruction if X is negative, and so on. The sequence of these statements which constitute the program is, as we have said, a specification as to how to do the problem rather than a statement as to what to do. Once this specification has been made, it is then only a matter of routine to use the computer to solve many of the problems of the workaday world.

As everyone knows, these commonplace uses of computers are of very great economic importance, so important, in fact, that they are already causing a revolution in our way of conducting research, of running mills, and of doing business. The important point to remember, however, is that these changes are brought about, not by some mystical process that can be known only to the elect few, but by the straightforward but detailed application of quite elementary procedures to problems that are essentially routine in nature.

ON THE FRONTIER

In contrast with these routine types of problems, there are many mental processes that people are called upon to perform that cannot be, or at least have not been, reduced to a simple set of rules. Take the process of playing a game of chess, not of simply adhering to the rules of the game, but rather the process of playing a good game against an intelligent opponent. There are no known procedures for guaranteeing a win, and yet people learn to play the game and some few become very proficient. Still another example might be the problem of proving theorems in plane geometry. Ignoring for a moment the Tarski decision procedure, which high school students do not know, it is still possible to develop a proficiency in proving theorems without involving the exhaustive process of writing down all possible strings of logically derived statements that might lead to a proof. Instead, one adopts a technique in which a number of more or less arbitrarily chosen procedures are explored in a rather incomplete fashion, each yielding some clue as to whether or not one is on the right track, until, through a series of hunches, one is led to a formulation of a satisfactory proof. In both of these cases, one can sometimes arrive at a correct or, at least, a very good answer in a remarkably short period of time, but there is a concomitant uncertainty as to whether or not a solution will ever be obtained and as to whether or not an apparent solution is the best solution.

Such a method of solving any problem has come to be known as a "heuristic" procedure, as contrasted with the use of an "algorithm," a term that is used in this connection to mean a completely specified solution procedure which can be guaranteed to give an answer if one but takes the time to follow through the specified steps. It should be noted that an attempted, but imperfect, algorithm is not per se an heuristic program. Heuristic problem-solving, when successful, must, obviously, be rated as a higher mental activity than the solving of problems by some more or less automatic procedure. We are, therefore, probably justified in attaching the label of artificial intelligence to machine methods and machine programs that make use of heuristic procedures.

There are two fundamentally different approaches to this problem of artificial intelligence. One approach, and this is the one that we will first discuss, consists in analyzing problems that seem to require the exercise of human intelligence and then devising a machine, or writing a program for an existing machine, which we hope will solve these problems. The specific mechanisms that the human brain employs in solving the problem do not here concern us; we analyze the problem, not the device that solves it. To call to mind a rather trite analogy, when man first attempted to fly, he studied the birds, and the early, unsuccessful flying machines were mechanical birds. It was not until man stopped studying birds and began to study aerodynamics that much progress was made. The modern jet airplane must cope with the same aerodynamical problems with which birds contend, but the mechanisms used in the solution of the problem of flight are quite different.

BIRD-WATCHING

The alternate approach—that of studying birds, not aerodynamics—does have its virtues, and, in the case of artificial intelligence where so much is still unknown, some very interesting results are being obtained by this route. I am referring to the general type of studies based on Donald Hebb's work at McGill, pioneered by Nathaniel Rochester of International Business Machines (IBM), by Farley and Clark of Massachusetts Institute of Technology, and, more recently, made popular by Frank Rosenblatt of Cornell University under the name of the Perceptron. The argument goes something like this. The brain of man, like that of the animals, is made up of many cells of a certain type called neurons. These cells have rather unusual properties; they react on an all-or-none basis ("fire" in the jargon of the trade) and transmit a pulse to other neurons through synaptic connections. Each neuron is connected to many others, and a number of input signals are, in general, required before a neuron will "fire." As far as we can determine, there is a certain amount of order in the over-all pattern of interconnections between the neurons, but there also appears to be a degree of randomness in the precise connections.

Learning seems to consist of alterations in the strength and even perhaps in the number of these synaptic interconnections. Now it is possible to devise a variety of mechanical, chemical, and electrical devices which simulate the behavior of individual neurons in a crude sort of way, and we can interconnect these devices in some random fashion to simulate the synaptic interconnections that exist within the brain, and, finally, we can arrange for the automatic strengthening or weakening of these interconnections using a training routine.

While the degree of intelligence achieved to date is indeed at a very low level, these devices have some very interesting properties. For one thing, they can be utilized in the solution of problems for which we do not have a complete mathematical formulation. A second and equally important attribute is that they are reasonably general purpose devices. As an example, a device built for the purpose of recognizing characteristic marks on paper might be trained to recognize English letters. The training would consist of presenting a sequence of inputs to the device, in this case the letters of the alphabet, and of strengthening those particular internal interconnections which would cause the device to give the correct response and of weakening connections leading to incorrect responses. This is quite analogous to the reward and punishment technique used in training animals. The important characteristic is that this device could equally well be trained to recognize Chinese or, for that matter to identify distinctive geographical features on an aerial survey map.

We will have time to mention only one additional characteristic, this being the apparent economy of elements, at least in terms of information storage, an economy which seems to result from the fact that the information is stored in the interconnections between the elements rather than in the elements themselves. We will return to this interesting subject after we have considered the "aerodynamics" of the problem.

BACK TO AERODYNAMICS

Marvin Minsky of Massachusetts Institute of Technology, in discussing the subject of artificial intelligence,[4] chose to divide the discussion into five different areas, these being Search, Pattern Recognition, Learning, Planning, and Induction. Although there is a degree of arbitrariness in this division, it seems to segment the problem in a way that enables one to come to grips with the essential features, and it demonstrates that there is no magic involved here. Instead, we are going to discuss a series of rather simple steps that can be mechanized. As an encapsulated summary, we can hardly do better than to quote Minsky:

> A computer can do, in a sense, only what it is told to do. But even when we do not know exactly how to solve a certain problem, we may program a machine to search through some large space of solution attempts. [That is, try many, many solutions, one after another.] Unfortunately, when we write a straightforward procedure for such a search we usually find the resulting process enormously inefficient. [There are just too many of them.] With Pattern Recognition techniques, efficiencies can be greatly improved by restricting the machine to use its methods only on the kind of attempts for which they are appropriate. And with Learning, efficiency is further improved by directing search in accord with earlier experience. By actually analyzing the situation, using what we call planning methods, the machine may obtain a really fundamental improvement by replacing the originally given Search by a much smaller, more appropriate exploration.

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[4] Marvin Minsky, "Steps Towards Artificial Intelligence," *Proceedings of the I.R.E.*, Vol. 49 (January 1961), pp. 8–30.

Minsky concluded his summary by mentioning what he called some rather more global concepts relating to Induction, and it is perhaps here that we will go our separate ways.

To bring the discussion down to earth, let us consider what might be thought of as the more or less trivial problem of programing a computer to play checkers. I have chosen checkers rather than chess partly as a matter of personal bias (having written such a program myself[5]) and partly because of the apparent simplicity of the game which highlights the problem of search. To get a computer to play checkers we must, first of all, represent the pieces on the checkerboard in a fashion which can be stored in the computer. Then the consequences of each of the available moves are to be analyzed by looking ahead, much as a person might do, considering each initial move in turn, then all of the opponent's possible replies, and, for each of these, all of the counterreplies, and so on. The average person is only able to continue this look-ahead process for two or three moves in advance, but one might argue that, since computers are so very fast, it should be possible to search through all possible moves clear to the end of the game and so determine, unambiguously, the relative worth of the different possible first moves. Unfortunately, computers are not that fast. Projecting ahead to the fastest possible computer, subject only to such limitations as the size of the universe, the molecular nature of matter, and the finiteness of the speed of light, it would still take many centuries, perhaps more than the total age of the universe, for such a computer, using this procedure, to make its first move.

HILL-CLIMBING

A person solves this problem by stopping the look-ahead process at a convenient point and by evaluating the resulting board position in terms of some intermediate goals: has he been able to capture one of his opponent's pieces without losing one in turn? has he been able to "king" a man? or, even, has he been able to develop an opening which will lead to the king row? This analysis cannot, by the nature of things, be exhaustive, and these secondary goals are not foolproof as indications that one is proceeding in the right direction. This general procedure is known as hill-climbing, and its shortcomings can be seen if one attempts to use it to get to the top of Mount Everest by always going uphill, starting, say, at Garden City, Long Island. There are two difficulties, the first being the existence of local peaks (if West Hill at 380 feet above sea level justifies such an appellation) and the second being the existence of flat regions subject to local perturbations (the surface of the ocean, for example) in which aimless meandering will occur unless very large steps are taken and the attendant danger that the desired peak may be completely missed unless the steps are small. Needless to say, a variety of different techniques have been developed to cope with these problems, but they may always be present to some degree, just as they always seem to plague man.

Having terminated a particular hill-climbing excursion, or a particular look-ahead process in the game of checkers, we must then determine the elevation, or evaluate the board position, to see if we are any nearer our goal. In the case of physical hill-climbing, there exist such things as altimeters with which we can measure our precise elevation, but, in the checker analogy, there is no simple measure of the goodness of a checker position. Of course, there is the possibility that we have encountered precisely the same position in some previous game, but this is highly unlikely except, perhaps, for opening positions and for the end game, so, instead, we must categorize the board situation, or classify it as belonging to some general class of board situations. The problem is not unlike that of recognizing a pattern of ink spots or smudges on the printed page which we identify as a printed character, an *A*, for example. This is the problem of pattern recognition.

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[5] Arthur L. Samuel, "Some Studies in Machine Learning Using the Game of Checkers," *IBM Journal of Research and Development,* Vol. 3, No. 3 (July 1959), p. 211.

Two steps are involved in pattern recognition. The first is the creation of a number of concepts, for example, roundness used in identifying *O*'s, straightness and the directionality of lines, and similar concepts. The second step is the assignment of weights to these various properties as they are used in identifying or classifying unknown characters. Attempts have been made to mechanize both of these steps, but, to date, very little progress has been made with respect to the concept-formation step, and most of the workers have been content to supply man-generated concepts and to develop machine procedures for assigning weights to these concepts.

MACHINE-LEARNING

It is here that we encounter the idea of machine learning. Suppose we arrange for some automatic means of testing the effectiveness of any current weight assignment in terms of actual performance and provide a mechanism for altering the weight assignment so as to maximize the performance. We need not go into the details of such a procedure to see that it could be made entirely automatic and to see that a machine so programed would "learn" from its experience. As a bit of corroborative evidence, the checker-playing program (to which I have alluded) does have this feature, and it is fairly easy to demonstrate that this program "learns" from its playing experience and that it gets to be a better and better checker player with time. An amusing consequence of this characteristic is that the program soon becomes able to beat the man who wrote the program, not because it makes use of any information or techniques not known or knowable to the man, but only because of its infallible memory, fantastic accuracy, and prodigious speed which enables it to make a detailed, but quite unimaginative, analysis in a few seconds which would take years for the man to duplicate.

We have gone into all of this detail not to make professional programmers out of our readers but, rather, to demonstrate how very prosaic the entire matter really is and how very far away from approximating the behavior of an intelligent human being our intelligent machines seem to be. I need only remind you that a checker master can still beat the best checker program, in spite of his pitiful memory by machine standards and a difference of more than one million in relative calculating speeds. Learning procedures have yet to be applied to anything more complicated than checkers, and the real problems to which we would like to address ourselves are many orders of magnitude more complicated.

A PARADOX

Perhaps we have said enough on the negative side. Progress is being made in machine learning, and we will someday understand why it is that a man can outperform a machine, and, as a result of this understanding, we will be able to devise better machines or even to program existing ones so that they can outperform man in most forms of mental activity. In fact, one suspects that our present machines would be able to do this now were we but smart enough to write the right kind of programs. The limitations are not in the machine but in man.

Here, then, is a paradox. In order to make machines which appear to be smarter than man, man himself must be smarter than the machine. A higher order of intelligence, or at least of understanding, seems to be required to instruct a machine in the art of being intelligent than is required to duplicate the intelligence which the machine is to simulate.

When we have at last achieved that degree of understanding required to write a program which will ape people in most of their mental activities, we will then feel the need to write a more generalized program for a machine which will cause it to write its own programs or to write programs for another machine. This, in turn, will require still greater understanding on the part of man. There is no end to this process, but, apparently, man as the originator will always be on top.

Our point, then, is that we have nothing to fear from the machine, at least in so far as there is any danger of the machine becoming more intelligent than man. The machine's intelligence is prescribed by man, and a higher intelligence is demanded for the prescription than for the execution.

ON SECOND THOUGHT

But, there is a fallacy in our argument. We have been assuming that man will not be able to construct an intelligent machine until he thoroughly understands the inner workings of such a device. Nevertheless, throughout history, man has discovered many properties of nature which he has not understood, and he has proceeded to use these properties both for good and for evil in spite of his lack of comprehension. We must, therefore, reckon with the possibility that man may yet create a Frankenstein monster in the form of an intelligent machine more or less by accident and long before he has developed the detailed knowledge required to control his own creation.

This brings us back to the alternate approach to the artificial-intelligence problem which we mentioned earlier, that of studying birds, not aerodynamics, since it seems reasonable to assume that, of the two alternatives, this approach is the more likely to lead to discovery without understanding. It will be recalled that the procedure is to simulate the brain by means of a randomly connected net of neuronlike devices in the hope that such an assemblage will possess intelligence. We might further argue that, since the details of the interconnections between the elements would be unknown, there would be a degree of uncertainty in our knowledge of the capabilities of the ensemble and in our ability to predict its behavior and, to this extent, the device might develop an intellect superior to that of man, its creator.

Such a development is, however, extremely unlikely. In the first place, there is the matter of relative size. It becomes increasingly difficult to interconnect neuronlike devices when the number gets much larger than, say, 10^6 or 10^7 elements, and, under these conditions, the individual devices must, of necessity, be quite simple. By way of contrast, the brain of man contains perhaps 10^{10} neurons, and the individual neurons have many processes which connect them in a very complicated way to other neurons. There are perhaps a hundred such connections on the average per neuron. In the face of this complexity, our feeble attempts at simulation resemble the nervous system of the flatworm more nearly than they duplicate the brain of man. This situation will not always prevail, and, with some of the newer computer-fabrication techniques, we may someday be able to make devices which approach the brain in complexity.

ONE CHANCE IN A MILLION-MILLION

A second factor has to do with our lack of knowledge concerning the detailed ordering of the interconnections in the brain. The brain certainly is not connected at random, although one can advance arguments to support the thesis that chance must play a part. For example, with a complexity measured by something like 10^{20}, it is hard to see how the entire specification can be contained in a germ plasm. There is also evidence of a great amount of redundancy, for there are cases in which relatively large portions of the brain have been damaged, or even removed, without any serious long-range impairment of the mental faculties.

Arguing on the other side, there is an observable gross ordering common to all brains. Above and beyond this, there is the ordering which is obviously necessary to provide the newborn child with the many reflexes and instinctive behavior patterns so necessary for his survival. Order is also betrayed by the many detailed mental quirks which we inherit. Finally, while men of genius, on the average, appear to have larger brains than their less fortunate brethren, this is certainly not universally the case, and the chief difference between prodigies and the mentally deficient seems to reside more in the detailed structuring of their brains than in mere bulk.

Of course, since we know substantially nothing about the ordering of the brain, an assumption of randomness is as good a place to start as anywhere else, but our chance of constructing a device resembling the brain of man is then something like one in 10^{12}. It will only be through an increased understanding of the basic mechanisms involved that we will be able to increase these odds, and, to the extent that we increase our understanding, we also increase our ability to control.

We can, therefore, reaffirm our previous conclusion that we have nothing to fear from the machine in terms of domination. This does not mean that man may not use the computer to harm mankind. The digital computer of today and the intelligent machine of the morrow are tools, just as the typewriter, the steam shovel, and the thermonuclear bomb are tools, and most, if not all, of man's tools may be employed by both saints and sinners. The digital computer may lack some of the destructive power of the bomb, but then the bomb owes much of its effectiveness to calculations made by computers and, in a sense, the computer will have to share the blame if man succeeds in destroying himself. It will be man, however, who must bear the ultimate responsibility, and attempts to assign blame to an inanimate collection of mechanical and electrical parts which man assembles, or causes to be assembled, constitute a shabby form of buck-passing.

MUSICAL CHAIRS

The entire threat of the intelligent machine is not so easily dismissed as one might judge from these remarks. While the machine may never be more intelligent than man, men vary in their intellectual capabilities, and the machine may and undoubtedly will surpass some men. The threat, then, is more one of technological unemployment than of domination. In a sense, this is but a continuation of the process which has been going on ever since man made his first invention. Such a statement does not solve the problem, but, in terms of its gross effect on employment, the intelligent machine should be looked on as just another form of automation and should not be singled out for especial approbation. Artificial intelligence is, of course, something more than another labor-saving device, since it augments man's brain rather than his brawn. In fact, it is quite apt to be that added factor in our economy which will enable man to solve the entire problem of technological unemployment, including that portion, if any, caused by its own introduction.

Programing computers to play games, to write poetry, and to solve high school problems is but one stage in the development of an understanding of the methods which must be employed for the machine simulation of intellectual behavior. We are still in the game-playing stage, but, as we progress in our understanding, it seems reasonable to assume that these newer techniques will be applied to real-life situations with increasing frequency and that the effort devoted to games and other toy problems will decrease. Perhaps we have not yet reached this turning point, and we may still have much to learn. Nevertheless, it seems certain that the time is not far distant when most of the more humdrum mental tasks, which now take so much human time, will be done by machine. Artificial intelligence is neither a myth nor a threat to man.

Detroit Automation

By Anderson Ashburn

ABSTRACT: Automation as a word was first used to describe the linking together of machine tools into a continuous production line by mechanical devices to load, unload, and transfer between machines or between stations in a single machine. As the meaning of automation has broadened, this original application has increasingly been described as "Detroit automation." Many examples are found in the automotive industry, but the technique has been successful in manufacturing appliances, motors, radio and television sets, and many other items produced in large volume. Some major problems have arisen that limit the economic size of a single automatic sequence of operations. Growth rate is limited by the balance between the degree of flexibility possible and the production volume that will probably be required. The rate at which automation is added in the metalworking industries has tapered off in the last few years but seems to be rising again, and continued increase, though at a less hectic pace, seems likely. The recent development of numerically controlled machines will do for small-lot producers what the transfer machine is doing for mass producers.

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A STEEL tube advances against a stop. Three sets of tools work to shape the end, inside, and outside of the outer ring for a tapered roller bearing. At the same time, a fourth tool is cutting the ring from the end of the tube.

A steel finger advances and catches the ring as it drops and deposits it on a conveyor. The cup, as it is called, rides through a washing machine, up an elevator, is turned over—if it needs to be—so that size and model can be stamped on one edge, goes through three furnaces and washing machines to increase the carbon content, harden, and temper it. The cup is ground all over in a series of four machines and then honed to a fine polish on the inside. It is measured by a series of gauges that use air pressure to check the size and taper of the bore.

Finally, the cup is washed, dried, dipped in oil, and wrapped in paper. The size has been so accurately controlled that cups need not be matched to the rest of the bearing. They will fit perfectly with the rollers and inner ring when eventually mated with them during the assembly of an automobile.

All of these operations and the passing of the work from machine to machine are performed automatically in one of the most impressive demonstrations of "Detroit automation" to be found in America.

This is one of the eleven automatic lines in the Bucyrus plant of the Timken Roller Bearing Company. Here, in a plant that has but 700 employees, the capacity is 30 million tapered roller bearings a year. The production is 192 bearings per man per eight-hour shift—about four times the rate by more conventional methods. Timken's investment in equipment for this plant is about $15,000 per man, compared with $6,000 in its other plants, but the opening of the plant was accompanied by a 15 per cent drop in the selling price of the bearings.

Most of the equipment in this plant seems essentially the same as the machines, washers, and furnaces to be found in other, less automatic, bearing plants. The obvious difference is that here each machine is equipped with devices that load and unload automatically and is connected with preceding and following machines by automatic conveyors. Actually, there are many other, less obvious, differences in the machines.

Thus, in theory, a bearing cup can go through the entire production sequence without being worked on by a human being.

In fact, people are required for this line. People to pull bearings out for spot inspections and to reset machines, people to sharpen tools and fit them precisely into position in toolblocks, people to snap these blocks in position replacing others that hold worn tools, people to oil, adjust, and repair the machines. And, on the six lines producing the inside bearing rings and their assembled rollers, people perform two operations that Timken engineers felt could be done better by hand.

DETROIT AUTOMATION DEFINED

What is Detroit automation and how does it relate to the whole broad subject? As a word, and to some extent as a concept, automation itself had its origin in Detroit.

It began at the Ford Motor Company late in 1946 when Del S. Harder, then Vice-President of Manufacturing, was reviewing plans for a new plant and said words to this effect: "Let's see some more mechanical handling between these transfer machines. Give us some more of that automatic business. . . . Some more of that—that 'automation.'"[1]

When the word was first published,

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[1] James R. Bright, *Automation and Management* (Boston, 1958), p. 5.

in a report on the pioneering work at Ford, it was defined as "the art of applying mechanical devices to manipulate workpieces into and out of equipment, turn parts between operations, remove scrap and to perform these tasks in timed sequence with the production equipment so that the line can be wholly or partially under push-button control at strategic stations." [2]

At that time, the Ford task force was concentrating on the automation of press operations, and the foregoing definition exactly described what was being done. Later, this same task force produced the first Ford Cleveland Engine Plant. In that plant, which has been erroneously called an automatic factory, there was an impressive degree of automation in the machining of the engine block, by which was meant mechanical handling of the blocks in, out, and between machines.

There was a difference, however. The work from two machines might be distributed to three—or combined in one—for the next operation, depending on how long the operation took. The introduction of division and combination introduced new elements of selection and control into the handling process.

Despite much technical criticism of the plant at the time, the Cleveland Engine Plant was a notable success for Ford and had a profound influence on manufacturing operations, first in the automobile industry and then in other metalworking industries.

Meantime, the word automation captured the fancy of most of those who heard it, just as it caught on with the handful of engineers who first heard Del Harder utter it. As shown in previous articles, automation has its roots much further back in our history, but the new elements of combining and controlling, the increased ability to control, and the application of the term all came at about the same time.

Thus, in the past decade, the meaning has been stretched to cover many other things than the linking of automatic machines into automatic lines. As a result, the term "Detroit automation" has come to be the popular term applied to the original application. It should be added that, within the metalworking industries, these basic applications are still usually called just "automation," and the addition of the adjective is rarely encountered.

Before going further, it might be well to define what is meant here by the word "metalworking." The metalworking industries are that group of industries that make their products substantially out of metal or materials that are used as metal replacements. These include all the builders of transportation equipment; electrical and communications equipment; cameras, watches, and all kinds of instruments; machinery; guns, tanks, missiles, and much other military equipment; and a wide variety of fabricated metal products including hardware, pumps, jewelry, and trombones. These industries could be called the machine-tool-using industries, because what they have in common is the need for machines that cut and form metal.

A FEW EXAMPLES

A brief picture has been given of one bearing plant and of the pioneering work done by Ford. Let us consider briefly a few other examples.

In the electrical field, a classic case is General Electric's Building 85 in Schenectady, where electric motors ranging from seven and one-half to thirty horsepower are produced on three automated lines. Here, a sophisticated degree of automation was applied to relatively low volume production. An innovation is that many of the conveyor lines connecting machines run under the floor. More than a hundred standard models are produced in batches with each model being turned out once in two weeks (when schedule estimates have been correct). The equipment for this plant took over two years to design, build, and get into operation at a cost of about $7 million.

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[2] Rupert LeGrand, "Ford Handles by Automation," *American Machinist,* Vol. 92, No. 22 (October 21, 1948), pp. 107–122.

Radio and television manufacturers have gone almost completely to printed-circuit boards to which components are assembled automatically. This required redesign of most of the components so that all the terminals come out at one end. This redesign permits the development of machines which insert the components into a board on which wiring has been etched and in which holes have been drilled for the various terminals. All of the connections between these components and the wiring on the board are then made at once by touching the surface of the board to molten solder.

There are holdouts who maintain that, when size is not a premium, the "old-fashioned" components that are hand wired have better reliability. Controversy over this point has enlivened many a meeting of electrical engineers.

The same basic technique of linking individual machines has been adopted in some industries outside metalworking.

Thus, the kind of automation found in the newer lumber yards, where boards are segregated automatically by length, width, and thickness, is a simple adaptation of the kind of conveyerized automation found in metalworking plants.

Some of the other manufacturing industries have adopted the same principles. Cigarette manufacture has long been the work of two automatic machines—one to make the cigarettes, the other to package them. Now, you begin to find these two automatic machines tied together by mechanical handling.

TRANSFER MACHINES

A slightly different approach to Detroit automation is to combine operations into a single machine instead of providing mechanical handling between machines. When this is done, we have a "transfer" machine, because the work is transferred from station to station within the machine.

Transfer machines can be relatively compact, with four or five working stations placed around a rotating table, or they can have the stations in a straight line with ten or a hundred stations. They can be for cutting, for presswork-ing, or for assembly. They can be built to handle small parts (one in a toy factory assembles wheels for roller skates) or larger ones (one in California machines the armored hulls of Army tanks).

Transfer machines have gone through an impressive development in the past fifteen years. This development has brought new machine tool builders to prominence and has changed the appearance of factories in many of the metalworking industries.

Transfer machines are an outgrowth of the special-purpose machine—the machine tool built to perform several operations on a special part (such as the camshaft for a particular engine) in contrast with the standard machine which can perform the same kind of operation on many different parts.

Builders of special machines have generally developed into builders of transfer machines. As the machines became larger, three major problems arose. The first was that the cost of obsolescence, if the product changed, was greatly increased.

When Ford built the first Cleveland Engine Plant, it was expected that the same basic engine would be produced for ten years, a reasonable expectation based on previous experience in the industry. However, the horsepower race soon developed, and Ford found it necessary to introduce a basically new engine —which involved virtual rebuilding of the Cleveland plant—in only five years.

This experience made Ford engineers the leaders in a move to find ways to make transfer equipment more salvageable. Transfer builders began to build their machines up from more-or-less standard "building blocks."

In Lima, Ohio, Ford built a modern plant to produce V-8 engines for the medium-price cars, starting production in 1957. The plant had four parallel lines, with a potential capacity of 4,000 engines a day. But the buyer's ideas changed, and, in less than two years, two of the lines were rebuilt to produce six-cylinder engines for the compact Falcon. A third was broken up to produce equipment for pistons and other components. It has been estimated that the ability to re-use the Edsel equipment for the Falcon saved about $1 million in tooling costs on the Falcon engine.

The second major problem that was created by the large transfer machine was that a work stoppage at any point for a tool change or for repair would stop the entire line. This was countered by a tendency to limit the number of stations in a single transfer machine. Instead of one machine with ninety stations, use three with thirty each. By banking a supply of work in progress between machines it would be possible to keep two machines running even if the third were stopped.

This approach has often been called "segmented automation," but, in fact, once this problem was recognized, it has become almost standard practice to provide banks of parts at various stages, whether the automation takes the form of transfer machines or of mechanized handling between individual machines.

The third major problem was the need for "debugging." When a manufacturer puts a consumer product on the market, it has—in most cases—already been through enough development to eliminate the small errors in design and manufacture that are inevitable with a new product. This same pretesting applies to machinery of standard design. However, when you build a one-of-a-kind, complicated, special production line, it is natural that some things will have been done wrong and some things will have been overlooked.[3]

These are universally referred to as "bugs," and the process of debugging an automatic production line will usually take weeks and may take months. As increasing use is made of standard components in special machines, the debugging problem is reduced, but it is not entirely eliminated.

NUMERICAL CONTROL OF MACHINES

A new element has entered the picture in the numerically controlled machine tool—a machine, that is, which is controlled by a numerical code. This can be supplied from punched or magnetic tape, by punched cards, or by dials, buttons, or other means. These machines are not properly Detroit automation and will be considered more fully in the next article.

Despite this, one or two points deserve attention now. The numerically controlled machine is really the antithesis of Detroit automation. In such a machine, you can change the part produced by simply changing the tape or other input that controls the machine. It is often a good way to make a dozen parts; it is likely—in the current state of development—to be a poor way to make a million parts.

Machine tools with numerical control

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[3] An excellent discussion of this problem will be found in Powell Niland, *Management Problems in the Acquisition of Special Automatic Equipment* (Boston, 1961).

seem likely to offer a form of automation to the plant producing lots of different things in small quantities—the job shop, in other words—just as the transfer machine and mechanical handling have provided a different form of automation for the mass-production shop.

The automobile industry, the first to go in heavily for automation, has been almost the last of the metalworking industries to give serious consideration to numerical control. Now that it is, this attention is for the purpose of producing tooling, such as press dies or assembly jigs, not to produce parts for the automobiles themselves. Which points up the fact that, even in the industry that is the symbol of mass production, there are still many small-lot operations.

BUT IS IT FEASIBLE?

In several surveys, we have found that the major reason given for adopting automation is invariably to reduce direct-labor costs. A close second has always been to increase output.

Both of these reasons add up to essentially the same thing: A need to control costs in the face of rising labor rates and increasing demand. And both reasons mean that automation will be adopted only under conditions in which it seems likely to save the company money.

The only other reason offered with significant frequency—and it turns up about half as often as the first reason—is to improve product quality.

We thus have a dual economic standard: If it is necessary to use automation to produce a product of acceptable quality, cost recedes as a controlling factor. If automation is considered only to maintain price competition, cost is the critical factor.

Technically, it is usually possible to provide any desired degree of automation, but the costs vary widely. If you are designing an automatic assembly machine, it is fairly easy to have the machine tighten bolts to a specified degree of tension—and do it more consistently than a man could. It is also fairly easy to have the machine insert a spark plug. However, it is extremely difficult to have the machine slip a felt washer over the spark plug before it is inserted.

There are some operations, then, where the technical feasibility exists, but such complications arise that it may prove more sensible not to attempt them.

HOW MUCH AUTOMATION TODAY?

There is no really accurate measure of just how much automation there is in the metalworking factories, but there are several ways of gaining an idea.

We do have a reasonably accurate count of the number of machine tools in the periodic studies made in the *American Machinist* inventories. The latest such count, made in 1958,[4] shows nearly three million machines, about 2.2 million of them in the production lines and toolrooms of the metalworking factories, the rest in schools, military installations, and the maintenance shops of chemical plants, textile mills, cigarette factories, and the like.

Unfortunately, we do not know just how many of these are automated. We can be sure that all of the transfer machines and automatic assembly machines are in themselves automated and are usually a part of larger automated lines.

In 1958 there were 16,000 such machines, just over half of them in the automobile industry. The rest were distributed primarily in such industries as those producing office machinery, household appliances, electrical equipment, and hardware. All these industries have in common a rather large production of a limited number of models.

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[4] "The Eighth Inventory of Metalworking Equipment," *American Machinist,* Vol. 102, No. 24 (November 17, 1958), pp. 129–224.

If these numbers seem small, it must be remembered that one multistation transfer machine may—though most do not—contain a hundred working stations and have an output equal to several hundred conventional machine tools.

Another approach to the question of how much automation is to measure how many plants have some degree of it. This amount has been rising steadily, according to a series of surveys we have made, to 19 per cent in 1957, to 24 per cent in 1960.

But simply because this automation tends to be concentrated in the larger plants, we have found indications that four out of five people in the metalworking industries work in plants that have some automation.

The numerically controlled machine is of much more recent development than the Detroit type of automation, but already there are about 2,000 such machines in use. A recent sharp drop in the cost of some of these machines—the Pratt & Whitney Company has offered a numerically controlled drill at less than $9,000, gambling that the resulting sales volume will make this price a profitable one—may cause a sharp increase in the rate at which such equipment is adopted.

So far, the peak period for the introduction of automation seems to have been from about 1950 (when the impact of what Ford was doing really began to sink in) to about 1958 (when it became clear that there was a good deal of excess production capacity in most of the metalworking industries).

PROSPECTS

The automobile industry, first to undertake automation, has found its public rather fickle in recent years and has reacted by offering a larger variety of sizes and types of cars than most of us can remember. This variety has inevitably required some sacrifice of the level of automation. There is unbounded confidence that cars will sell this year, but there is frank ignorance as to which cars will sell. Until that question has been settled, the industry will move slowly on investment in fixed production lines. Once it is settled, there will likely be a rush to provide more automated production of the popular lines for 1963.

One point working in favor of another surge of investment is that a degree of standardization has recently been agreed on by the machine-tool builders and the automobile industry. This standardization applies to the working heights and the attaching surfaces of the various building blocks going to make up a transfer machine.

If, as seem likely, this offers increased opportunity to adapt automated lines to changing customer preferences by rearranging and even mixing units bought at different times from different builders, it may make a basic change in the economic level at which automation is feasible. In other words, you will not have to be quite as sure that this year's basic model can be sold for quite as long as was previously required to risk investment in automation.

This change conceivably could make for a new and fairly intensive round of investment in automated production lines, not only in the automobile industry, but in a number of other industries basically dependent on consumer impulses.

It is possible that, from the perspective of time, the decade of the 1950's will be seen as the one great rush to automation in the industries that mass produce for consumers.

Sober evaluation of current equipment, however, suggests that many plants still have ample opportunity to improve their efficiency. The simple fact that three out of every five machines in use today date from before 1949, according to the current *American Machinist* inventory, suggests that.

It seems likely that 1962 will see a modest increase in the rate at which new equipment is installed, much of it going into plants that took little part in the extensive investment in automation during the 1950's.

The combination of some increased flexibility in the equipment used for production-line automation and the increasing acceptance of numerical control for small-lot automation suggests that the feasibility of applying automation now extends to most of the plants in metalworking, regardless of size and production volume.

The fact that it can be done does not imply it will be done. There have been some spectacular disasters, ranging from individual machines that never worked quite right to entire production lines that had to be scrapped without ever getting into full production and which were so specialized that they could not be salvaged for other work. Word of such experiences spreads mostly by word of mouth, and the disasters soon sound more cataclysmic than they really were. This inhibits any desire to rush into heavy investments.

We know more about automation in metalworking today. The chances of further disasters are less, though the fear remains. But the chances for spectacular additional gains in productivity seem somewhat less, too, at least until tomorrow, when someone finds a way to make them possible.

Process Control: Past, Present, and Future

By Thomas M. Stout

ABSTRACT: As process technology has shifted from batch to continuous operations, control procedures have also evolved. Manual adjustment of process conditions has been superseded by automatic controllers, which in turn are now being supplemented by computers that can exercise control over entire plants. Justification for these systems is found in greater production capacity, lower raw material and utility costs, and improved quality control. Labor savings have played little part in justifying computer systems for process plants where automatic equipment has already cut the number of people needed to a practical minimum. The future will see continued technical developments in the field and a growing number of installations.

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IF every instrument could accomplish its own work, obeying or anticipating the will of others . . . if the shuttle would weave and the pick touch the lyre without a hand to guide them, chief workmen would not need servants, nor masters slaves."[1]

How close are we to the workerless utopia which Aristotle envisioned? Some of his dreams have already been realized. Power looms, directed by punched cards, are almost two hundred years old. Mechanical music makers have a long history, from clockwork music boxes through the player piano to the modern juke box. And considerable progress is being made toward the development of machines and processes which, if they do not quite operate by themselves, operate with a very minimum amount of human supervision.

CONVENTIONAL CONTROL PROCEDURES

In the early days, raw materials were placed in a vessel and subjected to a succession of steps, determined by experiment, which was expected to produce the desired product. Control procedures consisted of careful adherence to the recipe, supplemented by magic phrases or requests for divine assistance. Constant attention was required to keep these batch processes running smoothly.

With the development of measuring devices, a real improvement in process control became possible. An even more important development, however, was introduction of continuous processes. By means of pipes and conveyors, materials could move in steady streams from one processing step to the next. Related conceptually to the modern assembly line, the continuous process offered obvious benefits in productivity and also had important consequences for process control.

In principle, at least, the advent of continuous processes simplified the operator's task. Temperatures and other variables were to be maintained at more or less constant values. An operator could read a gauge, turn a valve in the proper direction to correct any departure from the prescribed reading, and turn his back on the process for a short time. Only intermittent attention was needed to readjust process conditions after upsets caused by changes in raw material characteristics, equipment breakdowns, or other unpredictable events.

Partly to relieve operator boredom and partly to provide better process control, the automatic controller was invented. This device embodied means for measuring the condition to be controlled, comparing the measured value with a desired value, and automatically taking action to bring the two values into agreement. An early example was the steam-engine governor. Controllers are now used to regulate a wide variety of process conditions: flow, pressure, temperature, level, dryness, density, thickness, speed, and composition, to name just a few.

A typical automatic control system is shown in Figure 1. In this system, a process fluid is heated by passing through a pipe, or pipes, around which steam is made to flow. At the outlet of the heat exchanger, a measuring device senses the actual temperature of the process fluid. In the controller, a signal corresponding to the measured temperature is compared with a desired value which has been inserted by an operator. If the measured value is less than the desired value, a signal goes to the valve causing it to open wider, increasing the flow of steam to the heat exchanger and raising the temperature of the process fluid. If the measured temperature is greater than the desired value, the controller acts to close the valve, reducing the steam flow and low-

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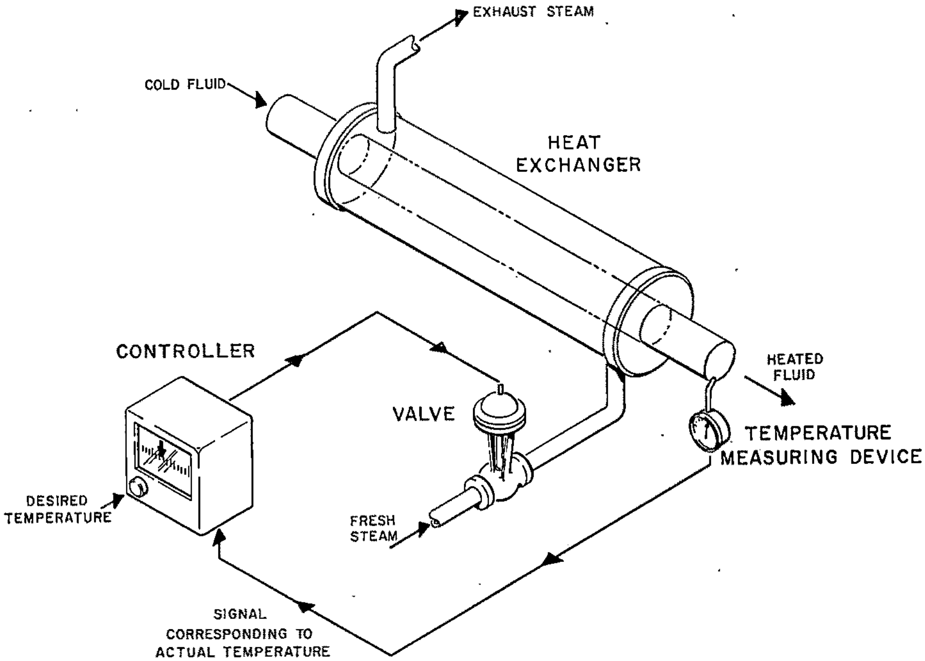
[1] Aristotle, *Politics*, c. 350 B.C.

FIGURE 1—TYPICAL AUTOMATIC CONTROL SYSTEM



ering the temperature of the process fluid.

With the introduction of automatic controllers, a major change occurred in the duties of a process operator. Now he does not have to reposition valves continually to counteract disturbances to the process. He is still expected to look out for actual and imminent failures of process equipment and instruments, keep a "log" or record of operations, and generally watch over the performance of the process. Together with process engineers, he also has to decide what .temperatures, pressures, flows, levels, and so on should be maintained at various points in the process. From an actual participant in the production process, the operator has become a supervisor.

DATA LOGGERS

As a supplement to conventional measuring and control devices, the automatic data logger was proposed about ten or fifteen years ago. Data loggers were connected to process instruments and operated electric typewriters to produce a permanent record of process conditions. The equipment could perform some rudimentary calculations, such as multiplying incoming signals by a constant to give outputs in proper units, for example, degrees Fahrenheit or gallons per minute. It could also provide daily totals for raw material consumption or production.

Data loggers cost perhaps $50,000 to $100,000 or more, depending on the number of variables involved. Justification for such expenditures was to be found in better data, for both accounting and engineering use; elimination of some standard recorders; and reduction in clerical labor needed to get routine accounting data from process records. In general, benefits proved less than adequate to justify the investments, and data loggers never became popular. Their functions are now performed in a growing number of plants by digital computers.

CONTROL COMPUTERS

The digital computer is a recent invention, dating from World War II. Designed originally for engineering and scientific calculations, and shortly thereafter adapted to accounting and business functions, digital computers are now being applied in manufacturing plants. Superimposed on conventional equipment and procedures, control computers have further modified the job of the process operator.

Internally, a process-control computer is much like the computers used for scientific and business calculations. In addition, it is equipped with means for connecting it to process instruments and control devices. As a result, it can (1) accept input signals corresponding to process conditions; (2) perform arithmetic computations (addition, subtraction, multiplication, division, and so on); (3) make comparisons (Is A larger than B?) and decisions; and (4) develop output signals for control and communication purposes.

A process-control computer usually has a variety of assignments. Its most important job is to determine and enforce the best conditions for process operation. In some chemical processes, for example, it is known that the best temperature at any particular time depends on the flow rate and composition of a feed material, the condition of a catalyst, the maximum tolerable amount of impurity in the product, and other factors. By means of equations built into the computer by the system designers, the best temperature can be computed and supplied as a set point to a temperature controller.

Because it continuously receives information from process instruments, the computer can generate a printed log. This record can include not only raw instrument readings but also computed yields and efficiencies for process engineers or average and total flows for the accounting department. Thus, the control computer serves part of the time as a data logger.

A control computer can be programed to carry out the complex sequence of operations needed to start up or shut down a large plant. The sequence used may be planned in advance or it may depend on measurements received from the process. In addition, the computer can check instrument readings for indications of trouble in the process by comparing the incoming signals against high and low limits.

EXAMPLES

A better understanding of the status of this field can be gained by examination of some specific systems. Although proprietary considerations often preclude publication of complete descriptions of computer control systems, enough information has appeared to give a fairly complete picture of their functions and objectives.

At the Texaco refinery in Port Arthur, Texas, a computer has been operating in the catalytic polymerization unit since early 1959. In this process, molecules of light hydrocarbon gases are joined together to make a motor-gasoline blending stock. Inputs to the computer include twenty-six flow rates, seventy-two temperatures, three pressures, and three gas compositions. The computer performs calculations and initiates several independent control actions, all of which are designed to increase the conversion of feed material into useful product. The computer (1) determines the maximum reactor inlet pressure consistent with compressor and vessel ratings; (2) distributes the available feed material to five parallel pairs of reactors to take advantage of any differences in catalyst activity which may exist; (3) determines the amount of water to be injected for catalyst activation; and (4), when needed, determines the amount of unreacted material that should be returned to the reactor inlet. Some calculations are made at five-minute intervals, others at twenty-minute intervals. Benefits sufficient to justify the installation are derived from increased conversion and improved catalyst life.

Another computer control system is operating in the Monsanto ammonia plant at Luling, Louisiana. In this plant, natural gas is reacted with steam and air to provide hydrogen and nitrogen in the proper ratio for ammonia synthesis. The reaction of hydrogen and nitrogen to make ammonia is carried out at high pressure. The computer system keeps the gas compressors fully loaded by reacting promptly to changes in atmospheric conditions which affect compressor capacity, and it adjusts flow rates as changes occur in the number of compressors available. Justification for the computer system is found in increased ammonia production.

At the Riverside Cement Company at Oro Grande, California, a computer has been used for about two years to direct quarry operations. Using data from an X-ray spectrometer, the computer performs blending calculations to insure that a mix containing the proper combination of elements is fed to the kilns. Computer functions will soon be extended to include direct control of a kiln. In this case, the benefits are improved cement quality and reduced operating costs in the quarry, as well as increased production from the kilns.

A computer system is now being installed to control two basic oxygen steelmaking furnaces for the Great Lakes Steel Corporation in Detroit, Michigan. In this process, scrap steel, molten iron from a blast furnace, and lime are placed in an upright cylindrical vessel. Oxygen is then blown into the vessel through a water-cooled pipe. The violent chemical reactions which ensue remove silicon, carbon, and other elements from the iron, simultaneously melting the scrap and forming a heat of molten steel. By making more complex calculations than an operator can, the computer will exercise close control over furnace charging and insure that a high percentage of heats finish at the specified temperature and composition.

Most of the other computer systems installed in the steel industry have been applied in metal processing operations. In a reversing roughing mill, for example, ingots measuring perhaps 2 feet by 4 feet by 7 feet are rolled into slabs measuring maybe 6 inches by 4 feet by 28 feet. This modification in shape is accomplished in a number of passages between rotating rolls, the separation between the rolls being reduced for each successive "pass." Under manual control, an operator is responsible for positioning the rolls, setting roll speeds, reversing the direction of travel of the ingot, and turning the ingot so the desired width and thickness are both achieved. Punched-card systems are being employed which enforce a prespecified sequence of control actions. The next step in reversing mill control will be a computer system which either stores the necessary sequences in its memory or computes them anew for each ingot. The automatic systems are expected to give maximum mill productivity with a minimum risk of damage to mill equipment. Systems of a similar nature have been or will be installed to control subsequent hot and cold rolling processes, annealing, and tin-plating lines.

The electric power industry is installing a large number of computer systems to perform several different kinds of functions. Many of the systems are primarily data loggers which compute boiler and turbine efficiencies from plant instrument readings and print out the results to guide corrective actions by the operators. The desired result is reduced fuel costs. A number of systems will be able to start up and shut down generating units as the electrical load increases and decreases during the day. In this service, the computer leads the plant through a complex sequence of events, noting at each step if a valve has closed, a pump started, a specified temperature has been attained, or any of a number of tasks have been correctly executed. The major justifications here are the expectation of fewer operator errors, which could lead to damage to plant equipment, and a reduction in the time needed to place a unit in operation. A few digital computers are being installed to calculate the most economical way to allocate load to available generating units and automatically to order individual units to take their assigned part of the load.

MISCELLANEOUS APPLICATIONS

Digital devices are used in some other applications which can be called process control systems by a suitably broad definition of the term.

For example, Western Electric Company is operating a computer-controlled production line for the manufacture of precision deposited-carbon resistors at Winston-Salem, North Carolina. The resistors consist of a thin coat of carbon on a small ceramic cylinder, provided with electrical contacts at each end and sealed for protection from harsh environmental conditions; they are made in many sizes and used in great numbers in complex electronic devices. The control computer receives measurements of the resistance values, develops the equivalent of a statistical quality control chart, and takes action to change the thickness of the carbon coating if the values seem to be drifting outside the specified limits.

A production testing facility using another digital computer is employed by the Douglas Aircraft Company to check components and subsystems before their installation in complicated missile systems. The big advantage of automatic testing here is reduction in test time relative to manual methods, an important consideration since the total life of the equipment under test is limited and should not be exhausted in testing.

Other applications of a similar nature could be described, but space considerations make it impossible.

MACHINE TOOL CONTROL

A great variety of machine tools is used to cut, drill, press, grind, turn, punch, mill, and otherwise alter the shape of metal pieces. Automatic controllers and digital techniques are applicable to these operations as well as to the chemical processes already discussed.

One important class of machine tools is employed to remove metal continuously over the surface of a workpiece, ending with a cam, a turbine blade, a propeller, or some other object which must be shaped precisely. Examples are milling machines, lathes, and grinders. Machine tools of this kind were among the first to be controlled automatically.

In the earliest systems, the cutting tool was mechanically linked to a pointer which could be moved over the surface of a model, thus causing the cutting tool to machine a duplicate piece. Later, the connection was made electrical. Measuring devices were attached to the pointer and cutting tool to produce electrical signals corresponding to their positions. These signals were compared, and the difference was used to start, stop, or reverse motors which repositioned the cutting tool. Although the equipment is quite different, the basic concept is identical with the temperature control system shown in Figure 1.

In the next stage of evolution, now going on, the model is discarded. Instead, signals to the cutting-tool drives are obtained from punched paper tapes or magnetic tapes where the necessary information has been stored in digital form. For the simplest systems making only straight-line cuts, the tape must give the beginning and end points for each cut, as well as the cutting speed and other information. Tapes could be made by observing and recording the actions of a skilled machinist but are generally prepared in a more abstract fashion from drawings of the part to be machined, often with the assistance of a desk calculator or electronic computer. More sophisticated systems will rely entirely on computers to figure out the sequence of cuts. If a spherical surface is desired, for example, only the center and radius will be specified, and a computer will do the rest.

Other machine tools perform their operations only at specified points, rather than over entire surfaces. Examples include drilling machines, punch presses, and jig borers. Automatic control of such machines is somewhat different than for path-following tools. If a flat plate is to be drilled with a number of holes, for instance, the control equipment must move the drill spindle from one location to another, stopping at each point to pick the drill size and speed, lower the drill to the proper depth, and withdraw the drill. The same kinds of positioning systems are employed, however, and punched tapes are used to supply the necessary instructions in the proper sequence.

TECHNICAL AND ECONOMIC FEASIBILITY

Automatic controllers, with associated measuring devices and valves, have become standard equipment in modern process plants. Their necessity is not questioned on technical grounds, nor are economic arguments needed to justify their installation. Equipment for one control system of the kind shown in Figure 1—the temperature measuring device, controller, and valve—might cost about $1,000, with incidental equipment and labor doubling the total installed cost. If the measuring device is a composition analyzer, the cost is increased perhaps $2,000 to $10,000. Expenditures for control equipment constitute about 5 per cent of the total investment in a typical plant, varying somewhat with the nature and complexity of the process. Supply of conventional control equipment is a $800,000,000-a-year industry in itself.

In 1956 computer control of manufacturing processes was little more than an idea. Today, five years later, over 100 digital computers have been, are being, or will be connected to process instruments. Although the total is impressive, process applications constitute only about one per cent of the 11,000-odd digital computers now in operation. About one third of the on-line computer systems are installed in the chemical and petroleum industries; about one third in the electric power industry; about one sixth in the steel industry; and the remainder in cement and paper manufacture, gas transmission, production testing, and other miscellaneous applications.

When the idea of computer control was new, the objections raised by process operators were (1) we do not know enough about the processes to write the necessary equations, (2) we cannot measure the necessary variables, and (3) your computers are not reliable enough. While difficulties were encountered in these areas, the problems did not prove insurmountable. Today, the big question is: Will it pay?

The question of economic justification

is not an easy one to answer. Computer systems for process use are being justified on the basis of increased production, reduced raw material and utility costs, and improved quality control. These tangible benefits are generally expected to recover the cost of the system, which may be $200,000 to $500,000 (and sometimes more if extensive process changes are needed), in two years or less. A somewhat longer pay-out time is allowed in the electric utility field, which enjoys sure and growing markets and a relatively stable technology.

Although reduced labor costs are a potential source of benefits, manpower reductions have played a negligible part in justification of computer systems in the process industries. It might not be accurate to say that no manpower reductions have occurred, but, from personal observations, the statement is not far afield. This situation arises from the fact that computers have been applied in plants where automatic devices have already reduced the number of people needed for process operation to a practical minimum. Without question, new jobs in computer design, manufacture, application engineering, programing, and maintenance far exceed the number lost in computer control installations in process industries.

Machine-tool controls are justified by somewhat different arguments. This equipment is expected to save money through reduced tooling and get-ready costs, greater accuracy and uniformity of the products, lower scrap, longer tool life, and more rapid adjustment to design changes. Side benefits, more difficult to evaluate, are anticipated in more uniform production rates, easier production scheduling, reduced lead times, and more regular shipping schedules. As with the process-control computers, manpower reductions do not seem to loom very large in pay-out calculations, although in some applications operating labor per piece is greatly reduced.

EVALUATION

Considerable time and effort is required to predict the expected benefits and costs before a computer system is installed. As a result, some of the first systems were purchased on the basis of rough estimates and an element of faith. Many users have privately expressed satisfaction with their systems, and a few have indicated publicly that their systems are performing well and producing the expected benefits. Others are not yet ready to discuss the results which they are obtaining.

Proprietary considerations sometimes make it difficult for computer manufacturers to establish working relationships with potential customers and to obtain information on the performance of their installed systems. However, even with the best of communications, computer manufacturers and users face a difficult problem in evaluating their systems.

Postinstallation evaluations require figures for both benefits and costs. A measure of the benefits achieved is by far the more difficult of the two to obtain. In several cases, simultaneous process modifications have clouded the picture: at Texaco, new reactors were added, and at Monsanto, a new compressor was added. These changes in themselves increase process capacity, and careful calculations are needed to compensate for this effect and to isolate improvements due to the computer control system. Even where such complications are not present, the percentage improvement may be not much greater than the errors in the measurements, and collection of data over a long period of time is needed to separate real improvements from random variations.

Costs are reckoned more easily, but great precision is seldom obtained. For example, accountants do not always agree on the allocation of engineering or equipment costs to the computer project. Some process analysis and computer programing might be considered normal duties of process engineers, and some instrument changes or process modifications might have been made anyway. An important related question also arises: What portion of the benefits should be attributed to improved process understanding or new instruments? Solution of these problems adds to the time required for evaluation of computer control systems.

It is possible that more spectacular justifications will be found in installation of control computers in new plants. Here the data processing and display capabilities of the computer may render unnecessary some of the conventional indicating and recording devices, as well as some of the gear needed to adapt instruments in older existing plants to electronic computers. Even more interesting is the possibility that processes may be redesigned, with less internal storage and smaller vessels, because of the computer's ability to exercise close and co-ordinated control over an entire plant.

CONCLUSIONS

The computer control field has reached a state of adolescence and will soon reach maturity. Indications of this growth are—in addition to the larger number of systems now installed or in the process of installation—the announcement of new and improved computers; the growing tendency of computer users to buy equipment by issuing specifications and comparing bids, performing the system engineering and programing themselves; and the high frequency with which computers are being purchased for new plants. Around the corner are systems employing many computers, communicating with each other and performing some of the plant scheduling and co-ordination functions now done by office machines; the use of a control computer to replace rather than direct a group of conventional controllers; and the construction of plants which are designed specifically to take advantage of the control capabilities of a digital computer.

The Application of Information Technology

By JOHN DIEBOLD

ABSTRACT: Since World War II, rapid advances in theory and hardware have given us a significant new technology of information processing with widespread applicability. Electronic computers are the most common manifestation of this new technology. Today, about 5,000 general-purpose computers are in use in the United States, but more than 7,000 computer systems are on order. Computers are coming into use in such fields as machine teaching, language translation, medical diagnosis, air and ground traffic control, and weather forecasting. Prototypes of newer information systems promise pattern-recognition devices and self-programing machines. The most obvious advantages of automatic data processing are not likely to be the most important long-run effects of the techniques. The most critical issues that arise out of the potentialities of automation of information processing are not yet generally recognized.

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THE automation of information processing is destined to have a far greater influence upon all of us than would be apparent from a superficial view of what appears to be primarily a change in office and manufacturing methods. The force behind this influence is a new technology of information. This new technology will produce profound change in all human activity wherever information, its communication, and its uses occur.

In one generation, the technology has produced a whole new family of machines, the electronic computer. That it will continue to spawn more new machine families—only a few of whose forms and purposes we can yet see—is inherent to the nature of the technology.

Information technology will produce changes in how we do our work and in what we do with our lives. It will raise many new problems—technical, economic, social. We know little today about the form the technology will assume. But we can be sure that it will raise great problems and produce great change.

The experience we have had thus far in application of the technology to business and industry can perhaps provide some indication of the fundamental problems and changes that will be encountered. Management's experiences in the uses of the technology offer an interesting phenomenon for study. They provide the basis for some observations which may be useful in gauging the dimensions of some of the problems we will face as use of the technology develops throughout other areas of society.

INFORMATION TECHNOLOGY

It is to the technology itself that we must turn for a start in understanding the business, economic, and social consequences of the new developments it will create.

Underlying this technology is a body of theory which contains new insights into the nature of information, its communication and its use, and new insights into controls—control of objects such as machine tools and industrial processes, controls for the organization and performance of work in business and in government.

Information theory had its origins in World War II in the scientific research associated with development of radar and the military systems for using radar data in directing combat fire control. As the theory developed, it opened to us a new understanding of the nature of information. It would be difficult indeed to overstate the magnitude of change that is to take place in our lifetimes and in all human history as a result of this information revolution that has so unobtrusively taken place in the past twenty years.

Information technology is built on the twin foundations of theory and of physical advances in electronics, optics, and other related sciences. Together, they are yielding to mankind entirely new tools, new resources, and new capabilities. It is ironic, and it is disturbing, that the new tools, the components and techniques of automation, are so fascinating that they tend to obscure the basic importance of the underlying technology. We must learn to distinguish between the machines of automation and the basic technology which continues to make them possible, or we invite a dangerous imbalance in our ideas and attitudes.

The technology is developing at an accelerating rate. Consequently, many tasks which are impossible or uneconomic today become the casually accepted routine of tomorrow. The technology manifests itself through a constant flow of new developments which have their beginning in theory and their end in the service of men.

Among the many striking developments of recent months are the laser, a new component resulting from studies in electronics and optics, which makes a totally new means of long-distance communications possible; molectronics, which substitutes the structure of the molecule itself for electronic circuitry; the film memory, consisting of magnetized metal dots which are capable of storing enormous quantities of data. These are representative of the continually emerging devices which make us feel, with the Swiss journalist, Robert Jungk, that "tomorrow is already here." It becomes even more difficult to disagree with him when we review some of the more practical aspects of automation that are already firmly established in American business.

The Computer Family

The automation of information processing is part of a technology that is less than twenty years old. The electronic computer was its first physical manifestation, and the computer's record is impressive. Today, over 5,000 general-purpose computers, 1,200 magnetically controlled machines, and an even larger number of punched-card calculators and other small computing devices are at work in this country. They are in business offices and factories, in universities and at research centers, in banks, oil refineries, department stores, engineering offices, and military installations. Nearly six hundred commercial data-processing service centers are serving clients from almost every classification of American enterprise, and new centers are opening for business at the rate of one per week. Yet, with all this current activity, United States manufacturers today have orders for over 7,000 more computer systems. In other words, more systems are on order today than have been built in the sixteen years since the first commercial computer was marketed! A dramatic illustration of the growth of computer use comes from American Telephone and Telegraph Company, which expects its 1970 revenue from long-distance communications between machines to exceed its revenue from city-to-city telephone calls placed by humans.

Information processing has many more applications than are found for it in business, however, and new uses for the computer family are under continual development. Their scope can be suggested in half a dozen brief examples of machine systems the technology will produce in the years ahead.

Networks of information-retrieval machines will soon be able to search vast stores of data automatically and print out their contents or display them on screens. The rapid and extensive literature searches thus made possible will offer expanded resources to industrial, scientific, and academic research and will enhance the role of our libraries.

Teaching machines and programed learning are altering some fundamental concepts of industrial training and public education. Machine systems can pace the individual student, can analyze his learning difficulties and mistakes as they occur, and can introduce remedial instruction as it is needed. They encourage a degree of personal participation by the student which is impossible in normal classroom work. Machine teaching is only in its infancy, but, with skillful programing, some professors have reduced university courses to one third and one quarter of the time formerly required. Significantly, machine-taught students exhibit a higher average retention level one or two years after completing their courses than has been achieved with conventional methods of instruction.

Language-translation machines can scan a printed page, translate its contents from one language to another, make an abstract of the translation and store both text and abstract in "memory" until they are called for by an information-retrieval network.

Medical research is hampered by insufficient, rough statistics and reporting procedures. Information technology will allow the accurate measurement and uniform recording of hundreds of variables—pulse, temperature, blood pressure, respiration, individual medical histories, and so on—to assist the medical research scientist and to aid the physician in diagnosis and therapy.

Traffic control of air and ground vehicles is urgently needed as airlanes, highways, and streets become congested and as ever higher speeds become possible. Information technology makes it possible to monitor traffic flow and to make calculations and decisions with lightninglike speed. Such effective control systems are being installed both in this country and in Europe.

Reliable long-range weather forecasting will become a reality as earth-circling systems of satellites, electronic communications networks, and recording machines are developed which are capable of assembling, processing, and evaluating prodigious quantities of data from the atmosphere and outer space. Weather intelligence is a first step toward weather control.

SOME SIGNIFICANT PROTOTYPES

These and other computers and computer systems are the existing hardware of information processing. The facts of their existence, their usefulness, and their influence on our daily lives are of paramount importance. Yet they only suggest the achievements that may be possible for us in the future, the future that we are overtaking so rapidly. It is again to the underlying technology that we must look if we are to discern the pattern of machine-information systems and the impact that new machine families will have in serving all mankind.

Some of these new families are already in prototype. One is the "cybertron," an electronic information-processing system that does not have to be programed, that is, it does not have to be given step-by-step instructions as we must give them to computers. The cybertron goes through a learning process much like a child. After it learns the correct responses to certain stimuli, it will give those responses automatically when confronted with the same circumstances again. The cybertron has already learned to distinguish between real and false target echoes in sonar operations for the military, and its performance compares quite favorably with that of human operators. Soon it will be set to learn to evaluate data from electrocardiograms. Another highly advanced system is the "perceptron," a pattern-recognition device that distinguishes between letters of the alphabet and that can recognize faces and other objects. The perceptron is made possible by advanced research in human processes. Its designer is not an electronics engineer but a psychologist who based his work on studies of human perception and conceptualization.

Basic research into the processes involved in learning and recognition, knowing and remembering, association and interpretation of ideas and facts and events is contributing new knowledge about information systems. A whole new breed of technologists is conducting studies into organizational behavior patterns, taking their data from human groups such as corporation and government units. They study management methods and a variety of business situations with the hope that, by simulating human thought processes, they will find the key to understanding how decision-making takes place. Neurophysiologists are attempting to simulate

TABLE 1—ELECTRONIC DATA-PROCESSING APPLICATIONS IN THE UNITED STATES ECONOMY AS A PERCENTAGE OF TOTAL DATA-PROCESSING MARKET, 1960*

ECONOMIC SECTOR	SMALL-MEDIUM SYSTEMS		LARGE SYSTEMS	
Agriculture		.4		—
Mining		.7		—
Contract Construction		1.0		—
Manufacturing		50.1		33.4
Food-Textile	11.6		2.2	
Process Industry (including metals)	14.7		10.4	
Machinery	12.4		9.5	
Transportation	5.9		8.6	
Other	5.5		2.7	
Wholesale and Retail Trade		10.7		7.4
Finance, Insurance, and Real Estate		10.8		13.9
Transportation		9.0		8.4
Communication and Public Utilities		2.8		6.8
Services		2.8		5.5
Government		11.7		24.6
Federal	8.3		22.3	
State and Local	3.4		2.3	
Total		100.0		100.0

* Data developed by John Diebold and Associates, Incorporated.

environmental influences and the adaptive behavior of the human metabolic system. Clinical and applied psychologists are studying human behavior, both normal and abnormal, and are investigating human perception, conceptualization, and memory processes. They are studying the problem-solving behavior of humans and of lower animals.

Scientific research into these and other areas makes substantial contributions to the automation of information processing by supplying new knowledge and new information to automation technologies. At the same time, it is the information technology itself whose capacity for collecting, sorting, analyzing, and projecting scientific data has created a resource without which the research would not be possible. The mutual support proffered by automation technology on the one hand and by the physical, behavioral, and biological sciences on the other offers great promise to mankind. Many of our horizons are still distant, but they seem more and more to be attainable.

COMPUTER APPLICATIONS

For a sound assessment of practical achievements in the automation of information processing, American business furnishes the central reference. Business experience and familiarity with automation in manufacturing processes, in accounting, in sales and inventory analysis, and in the maintenance of many financial, bookkeeping, and operational records offers substantial evidence of the problems and opportunities involved. Business applications of the technology are limited almost entirely to the computer family. Table 1 indicates the extent to which they have pervaded all segments of our business economy, including government, in a very brief span of years.

When studying the figures in Table 1, it is important to keep in mind that hundreds of millions of dollars are invested every year in the technology itself, in the manufacture of computing equipment, in the development of program systems or "software" for putting the equipment to use, and in providing scores of computer services for business and industry. The technology of itself is an important element in our economy.

In considering the business applications of automation, a number of misconceptions and oversimplifications are usually encountered. Prominent among these is the popular idea of the advantages that automation brings to business. Generally, these fall into the following groups:

(1) Economies through labor saving and reductions in work force, both in factory and office.

(2) Performance of new clerical tasks.

(3) New statistical and accounting procedures.

(4) Construction of performance models which project the consequences of action prior to final decision making.

These are the standard considerations usually advanced today when computer use is discussed. Within a relatively few years, they will, in fact, be looked back upon as having been among the least important business consequences of information technology. While the businessman is only too glad to recognize their benefits, he will find his operations even more greatly affected by organizational changes brought about in order to make better use of the technology and, most important of all, by organizational changes that will inevitably occur as a result of applying the technology within his business.

IMMEDIATE QUESTIONS

These changes—which will have the most basic and far-reaching implications for our entire business structure and, therefore, for all of us—are not always perceived by businessmen or by students of the technology. When they consider the application and procedural problems that automation offers, they find many fronts of more apparent immediacy on which to focus. There are myriad pressing questions for the business executive to face. Among them:

(1) In the face of rapid change, improvement, and almost daily advances in technology, when and how does he finally make the decision to go ahead with the purchase and installation of new equipment?

(2) What is the optimum investment he can make without jeopardizing his ability to meet future needs and to make future adjustments? How much of his investment now, in facilities, equipment, software, and staff, will he be able to justify in the light of new developments three years, five years, ten years hence?

(3) Are his cost standards and performance measures sufficiently developed to assure him of reasonable return on investment?

(4) How is he to resolve conflicting recommendations from automation engineers, from his own management executives, from equipment manufacturers?

(5) How far should he attempt to coordinate the activities of his separate divisions within a machine system? How much compatibility exists between the demands of his operating units?

These are undeniably realistic, substantive issues. But, just as the layman tends to associate business automation only with manpower problems and record-keeping functions, businessmen, industrialists, and engineers overlook or fail to be aware of the most fundamental issues of all. It is imperative that we all awaken to them, for their consequences are of crucial import not to business alone but to our entire economic and social structure.

FOUR CRITICAL ISSUES

These critical issues are almost never articulated, seldom recognized. Three of them are scarcely even acknowledged to be associated with the business consequences of automation; a fourth reveals a lack of appreciation for the true scope of information technology which must be corrected.

(1) *An organized discipline of information systems in business must be developed to replace the piecemeal approach that exists now.* The systems function, when it exists at all within a business, is a collection of mixed techniques usually dealing with operations

at a very low level—how many carbon copies to make, how to maintain usable cross-reference files, how to handle purchase requisitions, and the like.

Business is a complex information system, but we have yet to organize an effective approach to handling the flow of information within business. Our limitation is not attributable to the computer system, for the capability of machines has far outstripped our knowledge of how to use them to optimum advantage. What we lack is a fundamental understanding of the very business processes with which we have lived for many years. It is a truism that only when we attempt really to understand the functioning of a business system, in order to utilize most effectively our new technology, do we discover how little we know of our business operations and of ourselves.

Systems discipline will ultimately come from improved understanding of control concepts and control opportunities. It will spring, too, from a more perceptive appreciation of organization and organizational relationships, of the flow of information, and of how it should be used.

(2) *In order to achieve an organized discipline of business-information systems fully to utilize automation technology, a new professional classification is called for in business and industry.* The problem of building systems control requires the most thorough consideration and analysis by management. Yet management's very first rule, that authority must be commensurate with responsibility, is disregarded at almost every computer installation I am familiar with. The responsibility for incorporating technological advances, and putting them to work, is almost universally placed at too low a level, usually in a financial department, sometimes in the engineering department. Further, this responsibility tends to be associated with just one functional leg of the business and is not accepted as a company-wide service. These factors make it extraordinarily difficult to attract and hold men of the caliber to make truly great and imaginative management use of the technology. It makes it difficult for those working in the area to accomplish the magnitude of change that can and should be accomplished.

A new position must emerge within business organization to fill this vacuum. A differentiation must be made between operating responsibilities—between the manufacturing, marketing, and planning functions. A planning function, charged with responsibility for analyzing a company's business and performing research in business information and information systems, is now beginning to become apparent at suitably high levels within some managements. It is urgent that this new function, this new profession, be recognized and developed rapidly if full use is to be made of information technology.

EDUCATION FOR MANAGERS

(3) *The third basic issue is that of educating future managers in information disciplines.* The newly emerging planning functions call for versatile, skillful, highly trained information specialists and planning executives. The International Business Machines Corporation has initiated a professional Systems Institute, at graduate school level, which is attempting to piece together an organized discipline for education in information systems. Industry as a whole has not yet squarely faced the problem. Universities are more keenly aware of their responsibilities to prepare for the radical changes that will occur in professional standards. A number of special courses have been created in computers and information technology at undergraduate and graduate levels. It is essential, however, for the implications of the new

technology to be given greater attention in finance courses, in production, marketing, and industrial engineering courses.

(4) *The fourth great issue concerns the problem of business leadership in the social changes being created by automation.* The issue separates into two basic parts. Ironically, part of the difficulty we experience in comprehending them grows out of the fact that the consequences of one aspect have been overstated, those of the other understated.

Understatement applies to the degree of change that will occur in society as a result of automation technology. None of us should harbor any doubts that the change will be very great indeed. Technology is truly an explosive agent of social change. The first industrial revolution was a revolution not because of the new machines that were developed but because of the sweeping alterations they created in the social body. Society was completely and irrevocably changed, and the role of business within society was completely changed. The same thing is happening again, it is happening more rapidly, and the effects of the technological revolution we are now living through will run even deeper. We must identify the issue and prepare to meet it, or social change will engulf us.

MANPOWER DISPLACEMENT

Overstatement applies to the question of manpower displacement. It is unfortunate that almost all public discussion of automation has turned on this single issue. We know little about it. Emotional reaction runs high. It gives credibility to inaccurate accounts of the human suffering that will be caused by automation.

Manpower displacement deserves much attention and study. In actual practice it is difficult, if not impossible, to determine authoritatively how much labor displacement has taken place due to automation alone. The central facts are simply that very rapid change is taking place and that we are going to have to adapt to it. It would be irresponsible for any of us to pretend that unemployment will not occur; it is even more irresponsible to assume that society is incapable of meeting such a challenge. The task is complex but deserves attention and action. The heart of the matter is that of adaptability; it can and will be resolved by education.

It is critically important that we develop a capacity and talent for leadership in this new era of technology. If we do not establish the momentum to lead society into tomorrow's world of automation, we will have no choice but to fight a retreating, defensive action that will ultimately cost us our political and economic freedoms.

We are demonstrating that we can lead in developing the physical aspects of a new technology. We must demonstrate that we can direct it for the enrichment of men's lives everywhere. In shaping the society of the future, we must never lose sight of the overriding responsibilities and outstanding opportunities that are posed to business leadership.

The Great Employment Controversy

By Walter Buckingham

Abstract: The fear of technological unemployment is a very real one in the minds of millions of American workers. Although the long-run record indicates that technology and employment have expanded simultaneously, the short-run record contains plenty of evidence of temporary displacement, if not permanent unemployment, of a large sector of our labor force. Furthermore, there has been a tendency toward progressive economic decline in the last decade with the percentage of unemployment rising at the peak of prosperity of the last three business cycles, as well as rising at the trough, and with the length of the last three prosperity periods becoming shorter in duration. A retraining bill to alleviate these condition, in part, has been drawn up and has received wide bipartisan support in both houses of Congress and by the President. In the last analysis, however, private business firms, unions, and government will have to work more closely together to prevent the disadvantages of automation from outweighing the more obvious and more highly publicized advantages.

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IN 1934 Congress passed a resolution asking the Secretary of Labor to draw up a list of labor-saving devices and a parallel estimate of the number of people who had probably been left unemployed as a result of their use. There is no doubt that the introduction of machinery does indeed abolish many direct production jobs. But the assumption behind this kind of "obituary accounting" is that there is only one effect from the introduction of new machinery or methods and that this effect is to reduce total labor requirements. If this assumption were true, it would follow that the labor saved could all be added up to a total of unemployment. To carry this to its logical conclusion, if there had been no increased productivity at all and no expansion of new industries, unemployment would be about 41 million in the United States today because two-fifths of our 65 million work force (26 million) are able to produce as much as was produced in 1910.

Following this particular line of reasoning, a fear of technological unemployment would seem to be absurd. Since 1870, productivity in the United States has more than quadrupled. The same labor input now produces over four times as much value in goods and services. Yet employment increased over six times—from 10 million to over 65 million—during this period. It can also be shown that most of the jobs held by workers in the United States today would not exist if it were not for advanced technology.

But memories of the Great Depression die hard and the persistence of high-level unemployment, even while inflation threatens, keeps the specter of hard times alive. By its very nature, automation abolishes many jobs. This fact is behind the terror that automation strikes in the hearts of many workers. But technology takes many forms. There may be simple applications of scientific inventions, expanded mechanization, reorganization of production methods, several distinct types of automation, new product developments, and so on. These do not all have the same employment effects. Some do not save labor but require more of it. Some are really labor saving but have many effects, displacement of labor being only one of them. Obviously, for example, it is wrong to regard the electric light as solely replacing gaslights and candles. It replaced these older methods all right, but it also replaced unlighted streets and going to bed early. Likewise, the automobile did far more than replace the buggy. It mainly replaced staying at home and is now in the process of replacing cities and towns altogether.

The long-run record of technological growth coinciding with greatly increasing total employment has led many popular writers on automation to ridicule those who are concerned about unemployment possibilities. Going confidently to the other extreme, they predict a labor shortage in the future. The cheerful theory that all workers replaced by machinery will quickly find many opportunities for new employment implies that automation creates a new job, or several new jobs, for every job abolished.

The reasoning usually goes like this. Increased production from automation or other technological changes causes lower prices of the products manufactured because the principal way of unloading the additional output must come from lowering the price. Advertising and sales drives have their limits, and, in the last analysis, prices will have to be cut to stimulate sales and unload the bulging warehouses of automatically produced goods. The result of increased sales, according to this reasoning, leads to an increase both in production of the product and production of the machines that produce the product. This increase in production of products and machinery leads to increased employment. Increased employment is supposed to lead to a greater demand for all these goods, meaning both a desire and the ability to pay for them. Even where a price cut does not lead to increased sales in the particular plant or industry, the price cut is supposed to result in extra dollars in the hands of consumers which they will spend in other industries, stimulating employment there.

This particular sequence of events has sometimes occurred in history, but, more often, it has not. The whole theory depends on an automatic self-regulating market which, in turn, requires a high degree of price competition in product markets and easy, large-scale mobility and flexibility of labor, capital, and other elements of production. Prices of automatically manufactured products have not fallen, except in a few instances, so it must be concluded that, in general, the conditions of pure price competition do not exist in most industries.

Benefits and disadvantages

The long-run benefits of technological change have tended to obscure many of the short-run disadvantages. Nearly everybody knows that technology can solve a multitude of problems. Our spectacular economic growth has been due, in great part, to advances in technology. Untold millions of people, especially in the undernourished parts of the world, fully expect science and technology to solve all of their most pressing problems. Too few of us recognize that, while technology solves countless old problems, it also creates many new ones. All technological improvement is not a net gain. First, some new technology is necessary just to cure the ills of previous technology. For example, if afterburners are perfected for automobile exhaust pipes, then the air will merely be as clean as it was before the automobile came. Second, some new technology is workable but not yet economical—solar energy, for example. Third, nearly all forms of technology have enormous potential for human betterment but, if not clearly understood, can do more harm than good. This is especially true of automation.

Man lived about fifty thousand years without technology. At best, 10 per cent of the people were able to rise above subsistence, usually by enslaving the rest. In the last two hundred years, since the Industrial Revolution, the percentage of people living in abject poverty has fallen to about 15 per cent in the industrialized countries in North America and Western Europe. In addition to higher living standards, technology has contributed to better educational opportunities, more efficient and democratic government, the decline of superstition and traditionalism—in short, to a better life. But the full effects of the mental enslavement of mass techniques are not yet fully appreciated. Although our society has the highest living standards in world history, it is almost completely dependent on machines. The moron mentality of machines has measured our culture not in terms of intellectual or artistic accomplishment but in terms of automobile horsepower, cigarette mildness, and deodorant durability.

TENDENCY TO ECONOMIC DECLINE

The United States has become the first nation in the world in which the number of blue-collar production workers has declined while total output continued to rise. From 1950 through 1960, the number of workers in factory production in the United States fell 10 per cent while production rose 43 per cent and population increased 19 per cent. During this period, the number of white-collar office workers in industry increased, but the problems of labor immobility have prevented any satisfactory automatic rectification of this imbalance. Furthermore, there is evidence that, as office automation progresses, there will be a decline in the demand for clerical employees.

Two additional developments appear especially significant. First, each of the last three recessions has been worse than its predecessor. Three examples of this will illustrate this long-run decline:

(1) Each of the three postwar prosperity periods was shorter than the preceding one. The 1949–1953 economic expansion period lasted forty-five months; the 1954–1957 one lasted thirty-five months; the 1958–1960 growth period lasted only twenty-five months.

(2) The bottom of each of the last three recessions has been lower than the preceding one, falling from 6 per cent unemployment at the lowest in 1954, to about 7.5 per cent at the bottom in 1958, to a trough of nearly 8 per cent in early 1961.

(3) The rate of unemployment at the peak of each of the last three prosperity periods was higher than at the previous one. Unemployment at the peak of prosperity rose from 3 per cent in 1953, to 3.9 per cent in 1956, to 4.8 per cent in 1959.

Second, there is cause for alarm in the tendency to be content with an ever-growing acceptable minimum level of unemployment. Hardly anyone in this country today will admit publicly that even 3 per cent unemployment is attainable, although this was widely accepted only about five years ago. Now it has become popular to advocate returning to 4 per cent as a goal, although this is at least one million more unemployed people than the history of this country indicates is a reasonable and attainable minimum. Meanwhile, the official figures are challenged by many for understating the level of actual unemployment.

Deplorable as these trends may seem, the future promises little relief. The National Planning Association calculated in April 1961 that by 1962 it will be possible to attain today's production levels with 1.8 million fewer workers than were employed at the bottom of the 1960–1961 recession.

In the next ten years, 26 million new, young workers will enter the job market, according to the United States Department of Labor. This is not based on any theoretical projection of population growth. These people are already born and are in school. By merely applying normal mortality rates to that number, we have a highly accurate forecast of the number who will be in need of jobs, and the number is alarmingly high when compared with the most optimistic forecasts of available jobs. Thus, while there will obviously be departures from the labor force due to death, retirement, and other causes, the net increase will be far greater than ever before.

RECENT FACTS ON AUTOMATION AND EMPLOYMENT

Recent employment trends in certain basic American industries are especially alarming. In the electrical industry, employment of production workers dropped from 925,000 in 1953 to 836,000 in February 1961. Here was a decline of 10 per cent despite an increase of 21 per cent in production in this industry. Although there has been a large increase in the production of electrical appliances, a 50 per cent drop in employment has occurred in the production of these products since 1953. Instrument production has also enjoyed a major boom, yet today there are 30,000 fewer production workers—a drop of 15 per cent—than there were seven years ago.

In the manufacture of refrigerators and washing machines, the job decline has been about 18 per cent.

The year 1960 was almost identical with the year 1950 in terms of steel production and shipments, yet in 1960 production-worker employment in steel averaged 461,800 compared with 540,000 in 1950. This was a decline of almost 80,000. In this industry, the average work week was 35.7 hours in 1960, compared with an average 39.0 hours in 1950. Because of automation and the shift from airplanes to missiles, it has been estimated that the aircraft industry alone has eliminated 200,000 production jobs in the past few years, even though the industry's dollar volume has continued to rise.

Although automation, as strictly defined, is not the only cause of employment declines in some industries, general technological change has been a major factor. For example, during the postwar period, productivity in the soft-coal industry rose by 96 per cent while employment was falling by 262,700. Railroad productivity rose by 65 per cent during the same period of time while employment fell enormously by 540,000.

During the 1960's, it will be necessary to create an even greater number of job opportunities—perhaps as many as 4 million or more job opportunities every year—to provide employment for the average yearly growth in the labor force of 1,350,000 and the possible annual displacement of as many as 2.5 million or more workers from rising productivity.

NEED FOR MORE RAPID GROWTH

If automation is to benefit individual working people, it will have to be largely through its effect on raising living standards in the national economy and not through its impact on workers in individual plants. Physical working conditions are undoubtedly improved by automation, but there is no other definitely established benefit to workers in the automated plant.

For the most part, over-all economic growth will probably have to provide the economic environment in which new entrants to the work force and the victims of silent firing, such as forced job transfers, will be able to find opportunities for employment. The national economy must grow fast enough to maintain plenty of new job opportunities for workers displaced by automation. Major emphasis should be on the need for a really full employment and dynamic economy. To accomplish this, priority must be given to removing the anomaly of excess capacity existing alongside human suffering and unemployment. This can be done only by restoring a sufficiency of employment. But, above all, the obvious and highly publicized advantages of automation should not be allowed to overshadow the plight of the little man searching for a place in a growing economy.

We need much more broadly based concepts of unemployment than we now have. This country can no longer afford the haphazard manner in which people normally find their way into jobs. We cannot afford to allow such a high percentage of our workers to drift aimlessly into the blind alleys of obsolete occupations or fall accidentally into the jobs that will determine the course of their life. There is a vast, unmet need for more education of all kinds and for much more counseling.

We can no longer view recession as medieval Europe viewed the plague—as an inevitable turn of fate to be accepted with despair. There is no more reason to accept such great cyclical swings in output, or ever-rising levels of structural unemployment, than to accept an epidemic of smallpox. In the case of these economic diseases, as well as these ancient physical diseases, the causes are well known, and the remedies are effective when properly applied. Without built-in stabilizers, our modern industrialized and automated economy would tend toward ever greater fluctuation and instability. Large enterprises, high fixed costs, and the necessity for continuous operation of industry magnify the adverse consequences of shut down. Furthermore, prosperity itself is a potential threat to continued stability. The abundance of production which increases living standards also frees people from spending all their incomes unless they so desire. Whenever basic necessities can be secured by most people with only a part of their incomes, full employment and stability become precarious, because prosperity is then sustained by that portion of total spending which is dependent on confidence rather than physical needs. A prosperous economy is always potentially unstable in the sense that small changes in expectations can have magnified effects.

Yet there are reasons why our economy need not retain the tolerance for recessions that it has shown in the past. It is contrary to both logical common sense and humane considerations that millions of men should rust in idleness while they, and others, lack the goods they are capable of producing. Sheep may be marched, without protest, to slaughter, even though they can look ahead and see the results at the end of the line, but people have an instinctive sympathy for others and will fight to save them, not only from humane considerations but because they can see that they may themselves be next.

Furthermore, both major political parties have generously accepted the praise offered for prosperity, where they could, and have freely blamed the other party for unemployment. While the credits and blames may have been misplaced, the public has concluded from such arguments that recessions and unemployment are indeed controllable. The only remaining question would seem to be whether we must always wait until after a crisis is upon us (so that programs are hastily planned and executed and, hence, relatively ineffective) or whether we can develop a program and facilities set up in advance to meet the time of need.

RECOMMENDATIONS BY MANAGEMENT

Many leaders of American management have spoken out for legislation to end or reduce involuntary unemployment. Don G. Mitchell, vice-chairman of the Board of General Telephone and Electronic Corporation and head of Sylvania Electric Corporation, told the House Automation Subcommittee in mid-1961:

> There are some people who would insist that the Federal Government stay out of the picture. You and I know that this is impossible, because there are certain aspects of the problem, certain critically distressed areas for example, that will require the kind of massive support that only the Federal Government can provide.

Thomas Watson, Jr., President of International Business Machines Corporation (IBM), also told the Subcommittee:

> We seem to have automated our country sufficiently to supply all of the basic demands and a good many luxuries, and still involve only 93 per cent of our work force. . . . If all of the things which need to be done are worked into a national plan and begun in the near future, we can turn unemployment into an employment shortage and at the same time make our country so strong that we will create a much greater deterrance from attack than we have today.
>
> I believe we are at war. As soon as all of us realize it, we can begin to use all our tools to win it. This is no time to debate whether such a plan will mean more gov-

ernmental control of business and science. Of course it will. But the stakes are too great to let this worry stand in our way.

PROPOSALS TO CONGRESS

To remedy this serious and recurring problem of excessive unemployment, the House Automation Subcommittee, of which this writer was director, advocated a sort of "G.I. Bill of Rights" for those unemployed as a result of automation. Six of the seven members of the House Subcommittee on Unemployment and the Impact of Automation recommended, first, that there should be encouragement and assistance for those unemployed who are qualified and willing to undertake further education. Second, they recommended that the retraining of persons displaced from their jobs by automation should be encouraged by financial assistance to the states to enable them to modify and expand existing state programs of vocational education. Third, the subcommittee urged that emphasis be given to greater labor mobility. In some instances, they stated, permanently unemployed or technologically displaced workers and their families should be encouraged to move to areas in which job opportunities exist because it is often cheaper and sounder economically for workers to move to where the jobs are than for factories to move to where the surplus laborers are. This would result in workers being gainfully employed in production rather than rusting in idleness and wasting our most valuable resource—the labor power of our people.

CONCLUSION

Those who say that there is no such thing as technological unemployment are right if they mean that, in the past, depressions and mass unemployment could not directly be traced to technological progress. But this is not to say that there is no such thing as technological displacement. Displacement of labor and other productive factors are essential elements of automation as well as the older mechanization. Personal hardships caused by this displacement must be insured against, but it is important to remember that the displacement itself must not be prevented. Free movement of workers, capital, and natural resources among alternative occupations and geographical areas is necessary for obtaining the benefits of technological progress. Without flexibility and mobility of productive resources of all kinds, our economy would stagnate, and the rich harvest from economic progress would be lost.

Displacement can lead to unemployment, but it need not. There must be certain conditions prevailing in a country if individual worker displacement is not to snowball into severe unemployment. Because automation creates new jobs as it destroys old ones, the rate of automation emerges as a critical factor. To control this rate and to ease the transition hardships, management and labor must first join in assuming the responsibility for preventing those individual hardships and tragedies that are inevitable from automation. Second, it is the responsibility of the government to guarantee full, steady employment and conditions conducive to economic expansion. Ralph Cordiner, chairman of the board of General Electric, put it this way: "If, in spite of the best planning we can do, some people are temporarily unemployed because of technological change, both industry and government have a recognized responsibility to help families through any such periods of transition."

Automation and Skill

By Seymour L. Wolfbein

ABSTRACT: In the decade of the fifties, automation appears to have contributed to an acceleration of the long-term growth of the generally higher skilled, white-collar, service-oriented activities. This trend shows up both in the over-all statistics of occupational distribution and in the detailed case studies of automation in particular establishments. One apparent effect of the rising level of skill and educational requirements accompanying automation has been a disproportionate concentration of unemployment—especially long-term unemployment—on the unskilled and semiskilled workers. The outlook for the present decade is that the greatest growth will be in the number of jobs requiring high skill or high educational attainment. While we do not have extensive data concerning the specific skills and talents which automation demands, present indications are that emphasis must be put on training and education which make individuals as maneuverable, flexible, mobile, and responsive to change as possible.

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IN trying to gauge the impact of technological change on the occupational distribution and skill level of the working population, we come face to face with a surpassingly important dimension of the general problem of assessing the implications of automation. From management's point of view, we really deal with such problems as the very kind of labor force it requires to carry out its production and related programs; from labor's point of view, we go to a consideration of the very kinds of jobs which are available and the whole galaxy which surrounds such a consideration (wages, working conditions, and so on); from the public point of view (and this is of major concern to labor and management), the implications become enormous, if only in terms of the education, training, and retraining required to make available the requisite supply of skills.

It should be noted at the start that, despite the importance of the subject, the currently available data are hardly perceptive enough to provide unequivocal answers to the questions and issues that are posed. As a matter of fact, aside from the information from the decennial censuses and the broad-category data from the Monthly Report on the Labor Force, there is no systematic, organized program for collecting occupational statistics in this country. With what is available, however, plus the information generated by the growing number of case studies in this field, it is possible to delineate some long-term, over-all trends and the beginnings of some discernment on more recent developments.

LONG-TERM TRENDS

The data are perhaps clearest, and expert opinion is just about unanimous, that the events of the twentieth century, so far, have brought about an overridingly important shift in the occupational structure in this country toward a higher skill level in the American labor force.

The pertinent information can be presented in brief, summary form as follows:

	1910	1950	1960
ALL WORKERS	100%	100%	100%
WHITE COLLAR	22	37	43
Professional and technical	5	9	11
Proprietary and managerial	7	9	11
Clerical and sales	10	19	21
BLUE COLLAR	37	41	36
Skilled	12	14	13
Semiskilled	14	21	18
Unskilled	11	6	5
SERVICE	10	10	13
FARM	31	12	8

The data clearly show the rise to a plurality position of the white-collar worker; both professional and technical as well as clerical and sales personnel doubled their relative importance in the occupational standings. On the other hand, the enormous inroads into the farm labor force and the unskilled nonfarm laborer group in the last half century are also clearly depicted. The over-all stability in the proportion of the working population engaged as skilled craftsmen is also noteworthy and will be commented upon later.

It is impossible, of course, to factor out of the complex of social and economic forces which generated these occupational shifts those attributable to technological changes alone. But that they did have a significant role seems certain. In fact, we may even go so far as to say that the enormous increases in productivity on the farm, in the factory, and at home provided us with the vantage point from which we can afford, as a nation, to deploy such a great proportion of our manpower resources in the white-collar service-producing fields.

It should be noted that these broad occupational groupings mask some very important changes in specific jobs. Thus, the professional group, for example, not only increased greatly, it also changed significantly in its internal composition. From a group which was dominated by the traditional professional fields of teaching, the law, medicine, and the clergy at the turn of the century, it has moved now to where it embraces huge numbers in the engineering, technical, and physical science fields—under the impact, of course, of technological change.

The skilled-craftsmen field is also an excellent point of illustration of this trend. The relative stability in this group over-all masks some very great changes which took place in a wide variety of specific occupations.

Back in 1900, six skilled occupations (engravers, locomotive engineers, brickmasons, blacksmiths and forgemen, metal molders, and shoemakers) were so important in American industry that they together accounted for fully one out of every four in the skilled labor force of the United States. Today, they make up only one out of every twenty.

Back in 1900, there were another six skilled trades (carpenters, mechanics and repairmen, cranemen and stationary engineers, plumbers, electricians, and telephone and telegraph linemen) which made up less than two out of every five skilled workers. Today, our estimate is that the figure is closer to two out of every three.

One other point is relevant to round out our brief exposition on long-term trends, which will serve as the vantage point for examining current and future expectations in this field. Without attempting to assess cause and effect, the overriding fact remains that the trends just discussed have been accompanied by a significant upturn in the educational and training prerequisites for employment and an upturn in the educational attainment of the working population. Already, professional and technical personnel in the United States average more than a baccalaureate degree. Significantly, the clerical and sales group, which now accounts for one out of every five in the working population, already averages more than a high school graduation. There is apparently nothing in the offing, as we shall see, which will change this trend.

CURRENT TRENDS

How different automation is, in degree and kind, from previous technological changes can be assessed from some of the opening chapters in this volume. Its impact on the job and skill structure, whether it is different or not, is still a subject of considerable import and investigation today. Two main lines of evidence are currently being adduced on this front.

The first is in line with what we have presented so far in terms of trends among broad occupational groups. In this instance, the data are very much in accord with what has happened in the past. It was less than half a dozen years ago that we actually witnessed the reversal in position of the white- and blue-collar workers in this country. In fact, the past decade of the fifties saw an accelerated movement toward the generally higher skilled, white-collar, service-oriented activities, as can be seen from the brief, summary table presented above.

The broad movement in recent years towards jobs requiring higher educational and training prerequisites and generally higher skill levels was by no means confined to the service-producing industries. In the goods-producing sector *par excellence,* manufacturing, the trend also seems to be unequivocal.

Effect of recession

For example, in the year May 1960 to May 1961, covering the recent recession, factory employment declined by almost 700,000. All of this decline took place among the production workers. While no group, including skilled craftsmen, among these workers was immune to the impact of the recession, the preponderant majority affected were the semiskilled operatives and unskilled workers. Nonproduction workers—executives, legal staff, advertising and sales, clerical personnel—showed no decline at all; the actual change shown for them from May 1960 to May 1961 was an increase of 17,000.

This differential employment experience in factory jobs during a year of recession was particularly marked in the metalworking industries, which took the brunt of the downturn, accounting for about two-thirds of the total manufacturing decline over the year. In steel, fabricated metal products, the machinery industries, and transportation equipment, the production worker typically became unemployed, in contrast to the nonproduction worker who typically showed small employment increases.

Impact of automation

The second line of evidence along these lines is found in the series of "impact" studies, conducted in recent years both here and in some other countries, in which specific case studies of the impact of automation and technological change are made in detail and changes in employment and skill requirements are traced between the time prior to and after introduction of the change.

While there were obviously substantial and significant differences among different plants studied, it would be a fair appraisal to say that the general picture which emerges in the United States from this limited number of studies is one of gradually rising skill requirements, generated in good part by the reduction in requirements for the less skilled, accompanied by increases in some of the more highly skilled classifications.[1]

For example, here is the following quotation from a series of studies by the Bureau of Labor Statistics in the field of automation covering twenty offices: [2]

> The introduction of electronic data processing raised the average grade of skill of office occupations, but only to a slight extent. Routine low paid jobs becoming vacant during the transition period were eliminated, which resulted in the higher paid group making up a large proportion of the total in the affected group. The classification of electronic data processing positions at the top of the office pay structure also tended to upgrade the pattern.

Canadian findings

The story for neighboring Canada is apparently much the same in terms of both past and current trends. The movement toward the white-collar, service-producing fields has and is taking place there as well as in this country.[3]

In summarizing the Canadian Labour Department's studies in this field, Dr. W. L. Dymond in an address at McGill University said: [4]

> Broadly speaking, technological change today is stimulating increasing require-

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[1] Cf. *Impact of Automation,* U. S. Bureau of Labor Statistics, Bulletin No. 1287 (Washington: Government Printing Office, 1960).

[2] *Adjustments to the Introduction of Office Automation,* U. S. Bureau of Labor Statistics, Bulletin No. 1276 (Washington: Government Printing Office, 1960).

[3] Cf. *Report of the Special Committee of the Senate on Manpower and Employment* (Ottawa: Queen's Printer and Comptroller of Stationery, 1961).

[4] *Technological Changes and Their Impact on Employment, Occupations and Industrial Relations,* June 6, 1961.

ments for high trained manpower, while the technological changes of the twenties and thirties and even of the war stimulated requirements for semiskilled and unskilled workers as a result of the introduction of mass production techniques.

In surveying the impact of various technological changes in five industries in Canada, Dr. Dymond's comments include the following statements:

> [T]he need for semiskilled workers declines, while requirements for skilled maintenance and other highly technical occupations usually rise . . . a further most significant manpower impact is that the overall skill level of employment is pushed upwards as a proportion of the total labour force of the industry as the proportion of indirect labour rises . . . new products, improved and more complex production methods, greater quality control and other factors have all resulted in these industries increasing their requirements for more technical specialists such as engineers, technicians and a great variety of staff specialists. Increased maintenance of a preventive type is frequently associated with the introduction of more expensive and complex equipment. This has meant that the level of skill of tradesmen involved in maintenance activities has risen appreciably.

Assessment of findings

At this point it is necessary to enter some caveats concerning the assessment of the impact of automation on skill as shown by the evidence so far. The case studies made reflect the effect of technological change on the included plants only; the impact on related plants in the same or supplier industries could conceivably be different. A substantial proportion of the plants studied enjoyed high levels of activity and demand for the goods and services they purvey; the impact on plants and industries with declining activity and demand for their products could conceivably be different.

These studies and, of course, the data based on broad occupational groups which we have used show net changes over a period of time. They should not be construed to say that many individuals, especially in the short run, do not experience downgrading in both the skill level of their jobs and wages paid.

On balance, and over sustained periods of time, however, the evidence so far seems to indicate a rising level of skill and educational attainment accompanying changes in automation.

This evidence is buttressed, in a meaningful way, by looking at the other side of the coin—the skill level of those who are unemployed, especially those who have been jobless for long periods of time. Some of these materials have already been referred to in other parts of this volume. It is significant to note, in the past months when job levels have been increasing, that long-term unemployment has remained substantially high and that the unskilled and semiskilled workers have made disproportionately heavy contributions to these long-term unemployed.

One summary set of figures may suffice at this point. From the turn of the current business cycle (February 1961) to November 1961, payroll employment in the United States went up by about 2.5 million, one million more than expected on a seasonal basis. Payroll employment—as, in fact, did total employment—stood at a record high level for November. But long-term joblessness (unemployment of fifteen weeks or more) still stayed at more than the million mark; the very hard core (unemployed for a half year or more) still totaled about 700,000 workers. Significantly, the unskilled worker, who made up only about 5 per cent of the working population, contributed 13.5 per cent of the hard-core unemployed. His unemployment rate over-all, incidentally, was almost triple that of the skilled craftsman. The semiskilled operative, accounting for about 18 per cent of the working population, contributed about 30 per cent of the hard-core unemployed. In contrast, for example, the professional and technical personnel accounted for 11 per cent of the working population but only 2 per cent of those unemployed for half a year or more.

Whether it be the unskilled and semiskilled, or the young school dropout, or the older man who also has a high rate of long-term unemployment, one of the great common denominators which ties them all together is the lack of skill.

PROSPECTS FOR THE FUTURE

Occupational projections looking ahead to the rest of this decade are well-nigh unanimous in calling for a continued increase in the white-collar, more highly skilled, higher education-level jobs.

With an over-all labor force increase of 20 per cent scheduled for the 1960's, it is expected that professional and technical personnel will go up by double that proportion, all of this on top of another 40 per cent increase which actually took place during the 1950's. The remaining white-collar occupations, including the proprietary, managerial, clerical, and sales groups, also are expected to increase in employment at more than the national rate. Significantly, the same is also in the offing for the skilled craftsmen. On the other hand, semiskilled workers show a projected rise at less than the over-all national average, and unskilled workers are not expected to go up in numbers at all during this decade, despite an unprecedentedly large labor-force upturn in the making during the 1960's. Needless to say, these projections also emphasize the increasing educational and training prerequisites for employment as well.

One other major substantive point should be made in this connection. While trends in skill level can be deduced from trends among occupational groups, we are still at the earliest stages in studying and understanding the needs for specific talents, capabilities, and know-how which accompany automation.

Some of the more perceptive work in this field is being done by the Department of Scientific and Industrial Research in Great Britain, and some of the most recent materials from this group can be seen in E. R. F. W. Crossman's *Automation and Skill.*[5] In this work, Crossman notes that previous studies had already indicated

> . . . a common trend towards supervision rather than direct manipulation of the process, and towards skill based on knowledge of plant and equipment. . . . The emphasis was shifting from manual skills to those based on the ability to take in information and to organize and interpret it for action.

Crossman's investigations covered a wide spectrum of factories as well as covering such enterprises as a railway electrical control room, electronic computer, and the like. In looking at automatic techniques, he focused on continuous-flow production (transfer machines, automatically controlled processes), program machines (computers, electronically controlled machine tools), and centralized remote control (such as the railway control center).

It is significant that Crossman's studies lead him, tentatively at least, to emphasize the role of decision-making, of taking on responsibility, of "being intuitively aware of what is going on and what to do about it," the ability to interpret things and relate them to each other. He talks of resourcefulness and of diagnostic skill, of being able to see your way through several "strategies" in tracking down machine trouble. He refers to the French term "polyvalent" —the polyvalent craftsmen needed by the new technological age in which the man must have and successfully blend the attributes of more than one conventional skill.

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[5] London: Her Majesty's Stationery Office, 1960.

The points emphasized by Crossman have much in common with some of those pointed up by the Bureau of Labor Statistics in their case studies of the impact of automation, even though done from a completely different vantage point. Thus, in connection with automation related to an airlines reservation system, the Bureau of Labor Statistics talks of technicians who must "assume individual responsibility for equipment." The report goes on to say that "the technician's function has changed from that of a 'production type' repairman—to that of a skilled 'watchman.' " Similarly, in reporting on technological changes at an oil refinery, the Bureau of Labor Statistics says that "one of the most important personnel developments at the refinery during the postwar period has been a raising of educational standards for both supervisory and production workers," and the Bureau shows the increasing emphasis put on an individual's ability to memorize, concentrate, observe, follow instructions. And, again, in describing the effects of automation in a bakery, the report points to the increasing responsibility of operators of slicing and wrapping machines and the necessity to observe schedules in a synchronized manner with the rest of the automatic line.

As we have said, we are only at the very beginnings of an understanding of the kinds of specific skills and talents which automation demands. But, if the evidence in hand so far is indicative, then the emphasis is being put on the need for individuals with a broad-based training who have an educational and training foundation which makes them as maneuverable, flexible, mobile, and responsive to change as possible.

And, if this is the case, then education and training for the manually as well as academically oriented person, for the young in school as well as for the adult in training and retraining may have to move more and more toward the goal of helping the individual withstand and, in fact, take advantage of the inevitable changes which will take place in the relationship between what he learns and what he will be called upon to do in the world of work.

Automation and the Employee

By William A. Faunce, Einar Hardin,
and Eugene H. Jacobson

Abstract: Field research suggests that the impact of office automation upon job satisfaction varies depending on whether affected job aspects are intrinsic or contextual, whether the employees are in electronic data-processing departments which gain work tasks or in other affected departments that lose tasks, whether the computer is of large or medium size, and on several other circumstances. Office employees think the broad impact of office automation is to eliminate jobs and regard the methods changes as temporarily disruptive, but they often welcome change and rarely reject mechanization as such. Attitudes toward change appear to depend on the ability of the individual to deal effectively with change and on the skill with which the organization manages the change. Studies of factory automation suggest that automated plants are preferred as work places to less advanced plants, although they provide important sources of dissatisfaction. The sources of satisfaction and dissatisfaction vary over the course of adjustment to automation. Automation may affect the significance of work in our society by changing job content, redistributing employment opportunities, or decreasing working hours. Its effect will probably be a decrease in the importance of work and a continuation of the trend toward a leisure-oriented society.

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THREE aspects of the relationship between automation and the employee are discussed in this article. First, how does automation affect the job satisfaction and material welfare of employees? Second, what are the attitudes of employees toward automation and toward the very process of change? Third, how does automation affect the role of work in the lives of the employees? Although automation has occurred in many thousands of factories and offices, there have been few field studies pertinent to these questions. Furthermore, the relevant studies differ considerably in focus and method, so that meaningful generalizations are hazardous to make.[1] Our aim is to illustrate the diversity of effects rather than to make a broad, over-all assessment.

EFFECTS OF OFFICE AUTOMATION

In one study dealing with automation and job satisfaction, attitude surveys were conducted before and after the installation of a small to medium-size computer (IBM 650) in an insurance company having about 400 employees.[2] Satisfaction with variety in work, accuracy requirements, importance of the job to the company, skill requirements, responsibility involved, and several other intrinsic characteristics of the work increased for most employees. At the same time, there was no clear trend of change in satisfaction with such contextual aspects of the job as pay, promotion chances, the way the company handled changes in organization and procedures, and the nature of the company's information program.

The changes in job satisfaction varied depending upon the extent to which the computer affected the work methods and work load. The computer-area employees, who were initially in the keypunching and tabulating jobs, showed more increases than decreases in satisfaction with intrinsic jobs aspects, while the reverse was true for contextual aspects. The employees in the underwriting departments, who lost tasks to the computer area and had to adjust their work methods to its requirements, showed a mixed pattern, with about the same number of increases as decreases in satisfaction for both intrinsic and contextual aspects. The employees in the rest of the company, accounting for more than two-thirds of total employment, had essentially unchanged work methods and work load. They became less satisfied with the company's way of handling changes and with the lack of accuracy and promptness of company information, and became more satisfied with virtually all other aspects of their jobs. The differences among the three department groups were frequently small enough, however, to be random fluctuations.

The employees were also asked, in the survey after the installation, how much the computer had changed fourteen aspects of their jobs, most of which were intrinsic. The computer-area employees felt the computer exerted a large and favorable impact on the variety, work load, and skill requirements of their jobs but influenced only slightly their job security, promotion chances, and pay. The employees of the underwriting departments felt the computer brought a great deal of change in variety, work load, and accuracy requirements; lowered their job security and promotion chances more often than it raised them; and made for less variety in work, less work load, and lowered work interest in a number of instances. Employees of unaffected departments were not aware of much impact upon themselves.

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[1] For guides to the literature, see Gloria Cheek, *Economic and Social Implications of Automation: A Bibliographic Review,* Vol. 1: *Literature before 1957* and Einar Hardin, William B. Eddy, and Steven E. Deutsch, *Economic and Social Implications of Automation: An Annotated Bibliography,* Vol. 2: *Literature 1957–1960,* published in 1958 and 1961, respectively, by the Labor and Industrial Relations Center, Michigan State University, East Lansing.

[2] Einar Hardin, "The Reactions of Employees to Office Automation," *Monthly Labor Review,* Vol. 83 (September 1960), pp. 925–932.

While the preceding differences illustrate the employee perceptions of the role of the computer, the actual effect of the computer upon various aspects of the job is better reflected by a different set of findings. The employees were asked in the second survey what changes, regardless of cause, there had been in the job aspects. The computer-area employees continued to report more change than the other employees, but the differences between the two groups were usually smaller. The underwriting departments and the unaffected departments perceived much the same frequency of change, although changes were more often in the undesirable direction in the former group. Neither the computer nor other factors had materially altered the work methods and work load of the unaffected departments. This suggests that the effect of automation upon the fourteen job aspects, though real, was quite moderate, except in the computer area itself. The indication that the computer had only moderate effects on work environment and job satisfaction was corroborated in a study of another insurance company that had also installed an IBM 650 computer.[3]

Somewhat different findings were indicated in a preliminary report on a larger but less common computer. Mann and Williams found that the installation of an IBM 705 computer in a large public utility brought changes in organization, procedures, control, and job structure. They described the impact on the individuals by saying: [4]

> For many individuals this was a period of growth; for others a period of failure and disillusionment. The change severely tested marginal employees and supervisors, while at the same time giving the more experienced and able ones the opportunity to develop and to demonstrate their work potential. The dislocation and the loss of duties and jobs was a serious problem for some employees.

A Bureau of Labor Statistics study of office automation in twenty large business firms showed that, one year after automation, there had been increases in salary grade for more than four-fifths of the computer area employees, as compared with one third of the employees of other affected departments.[5] Virtually none were lowered in grade or lost their jobs. That office automation may well lead to different long-run results, however, is suggested in preliminary reports by Ida Hoos on another study of about twenty organizations.[6] Centralization of functions from branch offices to main offices occurring after a few years of automation reduced branch-office employment enough to necessitate layoffs or transfers with lower pay or poorer advancement opportunities and, hence, affected many employees adversely. Deterioration was not only found in the surviving routine, nonsupervisory jobs, which appeared less interesting and more machine-paced than before automation, but also in the middle-management jobs outside the electronic data-processing area, which became fewer and, thus, reduced the training and advancement opportunities of supervisors seeking to rise in the organization. The highly skilled elite of programmers and systems analysts, who, according to other studies, tends to consist of young and well-educated men, was strongly prone toward empire building and likely to become involved in conflict with other departments because of its own autonomy, key position, stress on efficiency, and lack of social sensitivity.

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[3] Einar Hardin, "Computer Automation, Work Environment and Employee Satisfaction," *Industrial and Labor Relations Review,* Vol. 13 (July 1960), pp. 559-567.

[4] Floyd C. Mann and Lawrence K. Williams, "Observations on the Dynamics of a Change in Electronic Data Processing Equipment," *Administrative Science Quarterly,* Vol. 5 (September 1960), p. 255.

[5] *Adjustments to the Introduction of Office Automation,* Bureau of Labor Statistics Bulletin No. 1276 (Washington, D. C., 1960), pp. 30–57.

[6] Ida R. Hoos, "The Impact of Office Automation on Workers," *International Labour Review,* Vol. 82 (October 1960), pp. 363–388; *id.,* "When the Computer Takes Over the Office," *Harvard Business Review,* Vol. 38 (July–August 1960), pp. 102–112.

EFFECTS OF FACTORY AUTOMATION

Several studies of factory automation have also been made. One of these dealt with the attitudes of workers transferred to an automated automobile-engine plant.[7] Three-fourths of the workers preferred the new automated jobs to their old nonautomated jobs, and the strongest preferences for the new jobs were expressed by those whose jobs were the most automated. The substantial reduction in materials handling which accompanied automation was the major reason for preferring the new jobs. Physical working conditions seemed to vary considerably from one department to the next and were, on balance, no better in the automated plant than in the nonautomated plant. Changes in earnings, except those associated with general contract changes, appeared to be few.

The new technology, however, increased the distance between work stations, the amount of machine noise, the amount of attention required by the job, and the extent to which the workers were paced by the machines. In consequence, the workers were less able to talk with each other during the work, tended to confine their communications to work-related matters, thought they made fewer friends at work, and felt socially isolated. Because they were required to pay closer attention to their work, were supervised more frequently by the foremen, and felt a constant pressure to avoid machine breakdowns, they experienced greater mental fatigue and work tension. In fact, where it existed, preference for the old jobs could most often be attributed to the social isolation of the worker and the increase in work tensions.

Mann and Hoffman studied the attitudes of workers in two power plants at different levels of automation.[8] The operators in the advanced plant liked their current jobs more than did those in the standard plant, when everything was considered. They felt they had more responsibility on their jobs, required more training, had to spend less time doing dirty jobs, learned more on the job, could move around in the plant, and had more contacts with the other workers than two years earlier, before the more advanced plant was completed and staffed. They felt more nervous and tense, however, which may have been caused by a feeling of greater dependence on others combined with the belief that they were inadequately trained and prepared for the automated technology. Because the two plants differed from each other in many respects in addition to level of technology, it is difficult to determine the exact role of the changing technology in the attitude differences of the two groups of workers. In particular, the careful selection of the work force and the use of job rotation, job enlargement, and a changed pattern of shift work in the advanced plant may account for much of the higher satisfaction of its workers. In so far as this interpretation is true, it underlines the importance of management practices to facilitate adjustment to automation.

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[7] William A. Faunce, "Automation and the Automobile Worker," *Social Problems*, Vol. 6 (Summer 1958), pp. 68–78; *id.*, "Automation in the Automobile Industry: Some Consequences for In-Plant Social Structure," *American Sociological Review*, Vol. 23 (August 1958), pp. 401–407.

[8] Floyd C. Mann and L. Richard Hoffman, *Automation and the Worker: A Study of Social Change in Power Plants* (New York: Henry Holt and Company, 1960), pp. 65–103.

A study by Charles R. Walker of an automated steel mill showed that job satisfaction may vary during the process of adjustment to the new technology. Automation increased the amount of attention and responsibility required, lessened the physical demands of the job, limited possibilities for promotion, and affected patterns of social interaction on the job. Response to these changes varied during the four-year period of the study. Walker summarizes this finding as follows: [9]

> The majority of crew members, though not all, were able to move from semi-manual jobs to semi-automatic ones and derive personal satisfaction from the immediate job content of those positions. They did not derive this satisfaction at first but after a period of acclimatization and experience. The same job characteristics, all stemming from the automatic or semi-automatic operations of the mill which had at first been feared and hated, *were later the source of satisfaction.*

RESPONSE TO CHANGE

In addition to knowing how employees respond to work situations at different levels of technological development, it is important to understand employee response to the fact and prospect of change in the work situation. From the point of view of the employee, the work situation probably involves continuous change, more apparent and dramatic when new technologies are introduced rapidly, but always present in complex organizations.[10] The normal pattern of change, like many constant influences, may not receive regular attention. But when one of the aspects of change is accelerated, as in the introduction of new technologies into relatively stable, well-established work procedures, change becomes the focus of attention. As an example, when even relatively small electronic data-processing devices are installed in established business offices, the consequences become a matter of concern to a large part of the work force, even though many employees may not be affected by the change. Employee response to innovation and change of this sort, as determined through questionnaire and interview studies conducted by the authors and their colleagues, will be examined in the following paragraphs.

Prominent among the initial effects of the installation of a computer is concern with the possibility that the new equipment will throw some people out of work. The employees we questioned were very much aware of the potential of the computer for replacing workers.[11] About three-quarters of them reported that machines were replacing workers in insurance companies. But, when questioned about their own job prospects, about four-fifths felt that it was very unlikely that they, themselves, would be replaced by machines. This reflected the actual work situation, in which no employees had lost jobs because of the computer installation.

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[9] Charles R. Walker, *Toward the Automatic Factory* (New Haven: Yale University Press, 1957), p. 192.

[10] Eugene H. Jacobson, "The Effect of Changing Industrial Methods and Automation on Personnel," *Proceedings of the April 1957 Symposium on Preventive and Social Psychiatry* (Washington, D. C.: Walter Reed Army Medical Center, 1959), pp. 235–252.

[11] Eugene Jacobson, Don Trumbo, Gloria Cheek, and John Nangle, "Employee Attitudes toward Change in a Medium Sized Insurance Company," *Journal of Applied Psychology,* Vol. 43 (December 1959), pp. 349–354.

More than half of the employees felt that their jobs had changed because of the new equipment. They saw themselves as having been promoted or transferred or as having the content of their jobs altered. The company officials and the research team, on the other hand, estimated that less than one third of the work force was affected in any significant way by the change. Apparently employees were associating many aspects of their own jobs with this very visible new influence in their lives. Changes that would have occurred if the computer had not been installed could be interpreted as related to it. Changes of a small magnitude or of a kind not noted by management might loom large in the eyes of the employee.

An additional facet of technological change to which the employee responds is the readjustment that occurs no matter how effectively the change-over may be managed. While two-thirds of the employees we questioned felt that the change-over significantly interrupted their normal work procedures, most of them thought they had adjusted to the change relatively quickly, within a few weeks. About one quarter of the employees felt that developments in machines and methods for doing work in industry as a whole were taking place more rapidly than is desirable, and only a small proportion felt they were taking place too slowly. But, when asked about the kind of job that they themselves liked, 70 per cent expressed a preference for a situation in which the work process changed from time to time. Apparently, with too little change, the job would be routine and monotonous, and with too much change, change itself would be threatening.

The major characteristic of the office automation we studied was the shift from human to machine processing of data. The employees anticipated that this shift would continue and would directly affect the jobs they were doing. Most of them liked to work with office machinery, would like to make more use of office machinery, and would be pleased to attend a training school to learn how to work with the new equipment, if job changes required this.

In general, then, employees perceived that the broad industry impact of automation and technological change was to eliminate some jobs. And many felt that these changes, at the industry and society level, were occurring too rapidly. But they distinguished these effects from the consequences of a particular adjustment in their own work situation which they judged on the basis of actual experience. When an abrupt introduction of a new technology was experienced, a larger proportion of the employees would see themselves as affected than might be anticipated by management on an objective basis. Usually, they saw the methods changes as being temporarily disruptive but quickly integrated into the system. They often welcomed change in their own work situations and expressed a preference for having some part of their work mechanized. We found no rejection of mechanization as such.

VARIABLES AFFECTING RESPONSE TO CHANGE

These generalizations about employee attitudes toward change should be understood in terms of some factors that are related to them and that are likely to vary considerably from organization to organization and within large organizations. These include the differences among employees in readiness for change and the history of the management of change in a given organization.

In Trumbo's analysis of readiness for change, employees that had better education, obtained better scores on personnel tests, were freer from job anxieties, and had benefited from past changes were more likely to indicate a readiness for change.[12] These variations in individual attitudes toward change seemed to reflect differences in ability to deal effectively with the demands of a changing situation and beliefs that the stress involved in change would be compensated by the opportunities that change offered.

It appeared that where change in the job implied change in the work group, those who attached higher value to social satisfactions in work had less favorable attitudes toward change. Another element of the social context, the supervisor-employee relations, also appeared to have a bearing upon attitudes toward change. The attitudes of the members of work groups were similar to those of their supervisors. Supervisors who were relatively authoritarian were less often in charge of employees who favored change. Perhaps authoritarian supervisors were usually put in charge of persons least likely to benefit from change.

The way in which the change is managed by the organization is a central concern of the employee. Mann and Williams used a case study of the introduction of a computer into an accounting division of a public utility to show that management skill in handling change has an important influence on employee response to the change.[13] If the organization has a record of concern for the employee and manages change so that the employee is protected, and, if possible, his situation is enhanced, employees are more likely to welcome change.

It is interesting to find, however, that employees who were better informed about the anticipated impact of technological change, as reported by Nangle, were not more favorable toward the change.[14] A more important factor was the employee's attitudes toward the company and its policies.

Office employees with relatively high social status, from urban rather than rural backgrounds, and in high status positions in the organization, were found more likely to welcome change.[15] This suggests, among other things, that a positive attitude toward change is likely to be associated with greater possibility of being involved in decision-making about the change.

AUTOMATION AND THE MEANING OF JOB SATISFACTION

Another important variable affecting both job satisfaction and attitudes toward job change is the significance of work to the individual. Satisfaction with an activity which is of major importance clearly differs in meaning and in behavioral consequences from satisfaction with an activity which is of little concern. Attitudes toward change in any activity can also be expected to be conditioned by the significance of the activity to the individual.

There is considerable evidence of variation in the function and meaning of work. Morse and Weiss found that a sense of accomplishment on the job, interest in a particular task area, and, in general, the assigning of importance to a specific work role were more characteristic of professional and managerial than of clerical and blue-collar workers.[16] Dubin found that work and the work place were not "central life interests" for almost three-fourths of the industrial workers he studied,[17] and Orzack, in a replication of the Dubin study, found that four-fifths of a group of professional nurses did regard work and the work place as "central life interests." [18] In a study conducted by the authors, it was found that the importance of work to the individual varied considerably with the job level.[19]

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[12] Don Trumbo, "Individual and Group Correlates of Attitudes Toward Work-Related Change," *Journal of Applied Psychology,* Vol. 45 (October 1961), pp. 338–344.

[13] Floyd C. Mann and Lawrence K. Williams, "Organizational Impact of White Collar Automation," *Proceedings of the 11th Annual Meeting, Industrial Relations Research Association* (Madison, Wis.: IRRA Publication 22, 1959).

[14] John E. Nangle, *The Effectiveness of Communications in Preparation for Change in an Insurance Company* (Doctoral dissertation, Michigan State University, 1961).

[15] William A. Faunce, "Social Stratification and Attitude toward Change in Job Content," *Social Forces,* Vol. 39 (December 1960), pp. 140–148.

This evidence suggests that the level of responsibility and skill required by the job has an important bearing upon the degree of significance of work to the individual. To the extent that automation changes these aspects of job content, it may affect the meaning of job satisfaction and job change.

Automation does appear to increase the proportion of the total operation for which the worker is responsible. The integration of separate operations into a continuous-flow production process means that a single worker observing lights or gauges on an automatic control panel may have responsibility for a large number and wide variety of production processes. The clerical worker who feeds stacks of cards into an electronic computer is also likely to be responsible for a larger share of information processing in the office. There is evidence that some workers regard their jobs as more important as a result of increased responsibility in this sense.[20]

It is obvious, however, that technological integration of separate operations is not the same thing as job enlargement. Many jobs in automated plants and offices involve less personal responsibility in the sense that neither quality of product nor work pace are controlled by the worker. Automatic inspection, control, and information-processing systems are designed to supplant human judgment in the production process. The elimination of direct participation in the work process can be expected to have an effect upon the function and meaning of work. The following quotation from interviews with workers in an automated plant seems to illustrate the feeling of estrangement from work: [21]

> [I don't like] the lack of feeling responsible for your work. The feeling that you're turning out more work but knowing it's *not yours really* and not as good as you could make it if you had control of the machine like before.

Irrespective of its effect upon the content of jobs, automation might result in an increase in the significance of work in our society if it increased the proportion of the labor force employed in more skilled, responsible, and prestigeful jobs. Studies of effects of automation suggest that there is a higher proportion of skilled workers in plants where automated equipment is used. This does not result from the creation of many new skilled jobs, however, but from a reduction in the employment of semiskilled and unskilled workers. Such changes mean that the work force in the automatic factory may be composed primarily of skilled workers for whom work is intrinsically important and to whom job satisfaction means pride in workmanship, but this work force may be small. Automation may contribute somewhat to the increased demand in certain professional and technical fields. These fields, however, in spite of their current rate of growth, still employ a relatively small proportion of the total labor force. The primary effect of automation upon occupational distribution will undoubtedly be to decrease the proportion of semiskilled and unskilled factory operatives. A majority of new workers who might otherwise have been employed as operatives will probably be absorbed into expanding clerical, sales, and service occupations.

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[16] Nancy C. Morse and Robert S. Weiss, "The Function and Meaning of Work," *American Sociological Review,* Vol. 20 (April 1955), pp. 191–198.

[17] Robert Dubin, "Industrial Workers Worlds: A Study of the 'Central Life Interests' of Industrial Workers," *Social Problems,* Vol. 3 (January 1956), pp. 131–142.

[18] Louis H. Orzack, "Work as a 'Central Life Interest' of Professionals," *Social Problems,* Vol. 7 (Fall 1959), pp. 125–132.

[19] Readiness to accept change in job content also varies with job level. Importance of work may be one of the variables affecting this relationship. See William A. Faunce, "Social Stratification and Attitudes Toward Change in Job Content," *op. cit.*

[20] William A. Faunce, "Automation and the Automobile Worker," *op. cit.*

[21] *Ibid.*

There is little empirical evidence regarding the function and meaning of work for people in these occupations. The existing evidence, however, along with an assessment of the nature of the tasks and social structural conditions of work in lower level white-collar occupations, would lead us to expect that work would not be regarded as a central life interest by people in these occupations. C. Wright Mills, in *White Collar,* concludes that for the "white collar masses," as for wage workers generally, the job is not intrinsically meaningful, and success, in the sense of technical craftsmanship, is not regarded as an end in itself.[22] The substitution of what Daniel Bell has called the new "salariat" for the proletariat as comprising the bulk of the labor force in industrial societies could not be expected to reverse the apparent tendency in these societies toward de-emphasis of work and an increasing leisure orientation.[23]

In the long run, a reduction of working hours made possible by automation may have a greater impact upon the importance of work than will any of the other factors we have considered. Productivity increases in the past have always resulted in a decrease in the average number of hours worked per week. There is little reason to suppose that increases in productivity attributable to automation will not sooner or later have the same effect. Where work requires a diminishing proportion of time and energy, activities unrelated to work will probably assume increasing importance. So long as professional, technical, and upper-level managerial positions employ less than a majority of our labor force, most people can be expected to use their increased leisure to seek meaningful activities which provide some relief from the functionally specialized nature of their work. The net effect of automation would appear to be a continuation of the already existing trend toward a leisure-oriented society in which work is viewed as an exclusively economic activity and in which activities other than work serve to provide meaningful experiences for the individual and to relate him to his community.

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[22] C. Wright Mills, *White Collar* (New York: Oxford University Press, 1956), pp. 215–238.

[23] Daniel Bell, *Work and Its Discontents* (Boston: Beacon Press, 1956), p. 50.

Industrial Relations and Automation

By Charles C. Killingsworth

Abstract: In industrial relations, "automation" is frequently used as a synonym for "displacement." More precisely defined, automation can have various direct and immediate effects on jobs. It may eliminate jobs outright; it may eliminate parts of several jobs; it may require new combinations of skills; and it may affect responsibility, working conditions, and the extent of worker control over rate of output. The impact of these effects has varied greatly in the past decade, depending on the nature of the work rules in the industry or the operation. Automation has been adopted most extensively in industries or operations which impose few barriers to reassignment of job duties—or in operations where collective bargaining is rare. Where automation has encountered rigid job lines and other restrictive work rules, labor-management conflict has at times been intense. As automation becomes more flexible and economical, it may invade such areas to an increasing degree. Labor and management and the government have adopted a variety of measures to prevent or alleviate displacement and to study proposals for future bargaining.

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A WIDELY noted collective-bargaining agreement of 1959 was that between Armour and Company and the two meat-packing unions which represent most Armour employees. The portion of the agreement which attracted attention was a provision for an "Automation Fund" of $500,000 to be provided by the company and for an Automation Committee to be composed of labor, management, and neutral representatives. The committee was empowered to study employee displacement problems, to experiment with certain remedial measures, and to formulate recommendations for consideration by the parties in collective bargaining. One rather anomalous aspect of this development which has escaped general attention is that automation, in the sense in which this term is used in most of the articles in this symposium, has as yet scarcely made an appearance in the production operations of the meat-packing industry. Armour had a substantial employee displacement problem in 1959, but it resulted from a management program of closing obsolete plants to reduce excess capacity and to centralize production. This program had resulted in the permanent closing of six plants and the termination of about 5,000 employees immediately prior to the negotiation of the 1959 agreement.

The Armour development is illustrative of the fact that, in a great many collective-bargaining situations, "automation" has become a synonym for "any development that may cause employee displacement." However convenient it may be to have a word—or a catchword—for referring to the problems of employee displacement, this usage tends to obscure some of the present and prospective effects of automation, more precisely defined, on collective bargaining.

Any discussion of the effects of automation on collective bargaining must recognize that one outstanding characteristic of collective bargaining in the United States is diversity. This diversity, broadly speaking, is largely the result of the decentralization of bargaining and the consequent shaping of bargaining systems and working rules to the circumstances of particular industries, particular plants, even particular departments and shops. As the discussion in this symposium demonstrates, automation, too, takes many forms. The diversity both of bargaining systems and of automation limits the possibility of broad generalization.

Sometimes automation completely wipes out particular jobs. More frequently, automation reduces the content of a number of jobs, creating the technical possibility of combining these fractional remainders into new jobs. Automation often changes skill requirements, the degree of responsibility, and the working conditions of particular jobs, and it frequently reduces the extent to which the worker can control the speed of production. These changes obviously affect the relative value of jobs for wage-payment purposes and the appropriate method of payment. Automation sometimes blurs the distinction between production work and supervisory or office work. These are some of the direct and immediate effects of automation, strictly defined. These are effects that have been dealt with in a variety of collective bargaining relationships in the past decade. The main emphasis in this discussion will be on reactions to these direct and immediate effects of automation. Speculation concerning assumed long-run and indirect effects of automation may titillate the imagination more than analysis of this kind. But the understanding gained from a study of actual experience is likely to be more reliable than speculation, however inspired.

JOB COMBINATION

Let us consider first the matter of job combination resulting from automation and the important differences between industries in the collective-bargaining rules on this matter. Two specific examples will illustrate the differences. The rubber industry is in the process of installing highly automatic curing presses for tires. The positioning of green tires in the presses, the timing of the cure, the removal of cured tires, and, in some instances, some post-cure shaping and loading on conveyor belts are all performed automatically. Only one employee is needed to place tires on loading conveyors. Older, less automatic press lines require a number of employees to perform a variety of operations. Hence, the automatic features of the presses, plus the one employee who brings tires to them have in effect replaced a dozen or more employees in perhaps four or five occupational groupings. In a few plants, some questions have arisen concerning rates of pay on the new presses, but I know of no instance in which the union has seriously challenged the elimination of the old occupational groupings or the substantial reduction in force on the new press lines as compared with the older ones.

Compare the case of the flight engineers in the airline industry. The introduction of pure-jet aircraft substantially changed the nature of the work load in the cockpit. Many of the control functions which the flight engineer performed on certain types of piston-powered airplanes are performed automatically or not at all on the jets. The duties of the pilots on the jets, especially during take-offs and landings, are substantially more demanding than on the piston-powered craft. Furthermore, the much greater speed and carrying capacity of the jets make it possible to fly many more passenger miles in the same time with the same number of cockpit employees. Since passenger traffic has not increased at the same rate as passenger-mile capacity per airplane, the employment opportunities for cockpit crews have sharply decreased. Hence, the pilots have insisted that the crew member who performs the residual flight-engineer duties should have the full skills of a pilot and take over some pilot duties; this would probably mean that the third seat in the jet cockpits would go to the displaced pilot of a piston-engine craft. The flight engineers have insisted that the third seat should go to a man with intensive mechanical training—which is the basic qualification of the present flight engineers.

The public bodies that have considered this controversy have generally found considerably more merit in the position of the pilots than in that of the flight engineers. However, when the first jets were placed in service, a number of airlines tried to satisfy both the pilots and the flight engineers by adding a fourth man (with pilot qualifications) to the cockpit crew. Neither group was entirely satisfied by this device, however, and the controversy broke out anew in 1961 when a strike by flight engineers shut down most of the major airlines of the country. As this is written (November 1961) a presidential board is attempting to resolve the controversy by mediation.

THE NATURE OF A "JOB"

With some exceptions which will be noted shortly, neither job elimination nor job combination which is related to technological change creates formidable collective-bargaining problems in most large-scale, mass-production industries such as rubber. Why not? Largely because the typical "job" in such industries has long been an impermanent, shifting bundle of duties. In automobiles, rubber, and many other industries producing durable goods, seasonal and cyclical fluctuations are strong, and, as production expands and contracts, many jobs are necessarily changed by the addition of duties or the assignment of some of the former duties to other jobs. A large proportion of the jobs in such industries do not require very much specialized training; a few hours or days of training is usually sufficient. The seniority agreements in such industries generally provide relatively broad transfer rights to other jobs in the bargaining unit. Typically, one union represents the great bulk of production and maintenance employees, and virtually all agreements contain no-strike clauses which are applicable to all occupational groups.

The cockpit of an airliner exemplifies a setting in which quite different working rules have developed. While the business of the airlines is subject to some seasonal and cyclical fluctuations, the amount of service offered is adjusted by adding or deleting flights. If an airplane flies, it is manned by the standard cockpit crew. The standard duties of each crew member are prescribed in great detail, not only by company rules and in some respects by governmental regulations, but to a considerable degree by the terms of collective bargaining agreements. The pilots belong to one union, the flight engineers to another. On most overseas flights, a navigator has also been necessary, and he has belonged to still another union. The unions have separate agreements with the employers. All of the cockpit jobs require many months or years of training, and the typical pilot cannot perform the flight-engineer job without additional training, and vice versa. In any event, neither has any seniority rights on the other job.[1] Each union has the right to strike to secure new contract terms without consulting any other union, and such a strike usually grounds the company's planes.

The airliner cockpit typifies many segments of industry in which job lines are firmly drawn, with the result that reassignments of work—even those dictated by technological change—are often resisted by the employees and unions involved. This situation is prevalent in such fields as the maritime trades, the construction industry, the railroads (especially train operation), most entertainment fields, many smaller establishments in the metal trades, and the printing trades, among others. Automation, strictly defined, has made little progress as yet in most of these fields.[2] As noted elsewhere in this volume, until quite recently, the most extensive applications of automation techniques were in the large-scale mass-production industries like automobiles, in process industries like petroleum refining and chemicals, in communications, in electrical utilities, and in data processing in many industries. Here, generally speaking, the employees have been organized in general (or industrial) unions rather than craft (or occupation-based) unions, or else unions have been weak or nonexistent, as in most data-processing operations. Hence, up to now, the kind of conflict that has developed in the airliner cockpit has not been a common result of the application of automation techniques. If automation spreads to areas of rigid job lines, then the reassignment of duties within work groups which automation frequently compels may generate the kind of stubborn collective-bargaining problems that we have observed in the airliner cockpit.[3] For example, the introduction of tape-controlled machine tools in small metalworking shops may create some difficult problems of work jurisdiction.

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[1] The collective-bargaining agreements covering cockpit personnel vary from one airline to another, and their terms are frequently renegotiated. Hence, the generalizations in the text are not equally applicable to all airlines at all times.

[2] There has been a great deal of discussion of "automation" (very loosely defined) in a great many of these fields. For example, "automation" has been an issue in collective bargaining in East Coast longshoring, but there "automation" means principally the use of large containers which are packed and unpacked away from the waterfront.

SKILLED TRADES JOBS

We must now return to the mass-production industries to note one rather important exception to the generalization that job lines there are impermanent and shifting. Most large factories employ substantial numbers of skilled tradesmen for maintenance, setup, tool and die work, and similar activities which are auxiliary to production. Even where these tradesmen are represented by industrial unions, the job lines are far more stable and change in them is resisted more stubbornly than is the case in direct production work. The United Auto Workers, for example, has repeatedly adopted resolutions pledging to protect "the integrity of the skilled trades," which means, among other things, to resist any reassignment of tasks or any job combinations in the skilled trades. Many, perhaps most, employers in the mass-production industries observe at least to some degree the established jurisdictional lines between the skilled trades in making work assignments. In one of the large automobile companies, for example, a long line of arbitration decisions requires that such "lines of demarcation" be observed. In a number of rubber plants, to cite another example, contract provisions give enforceable status to such lines under most circumstances.

The fabrication and installation of many kinds of automation equipment require unusual combinations of skills and some new skills, and such requirements have come into conflict with the established lines of demarcation in some instances. In several of its plants, Ford has attempted to establish a new skilled-trades classification identified as "Automation Equipment Maker and Maintenance," which combines some of the duties of seven different skilled trades. In one new plant, this classification was established before the union organized the plant, and the company succeeded in retaining the classification after union recognition despite efforts of the international representatives of the union to eliminate it. In another new plant in which the company had established the classification, the union succeeded in getting an agreement to eliminate it, but the *quid pro quo* was a concession from the union that the company could assign the tradesmen across traditional lines of demarcation on automation equipment. In still another Ford plant, a long-established one, the company attempted to induce the union to agree to the establishment of the combination classification, but the union refused—with the strong support of the skilled tradesmen of the plant. In a rubber plant, the company attempted to establish a new skilled classification of "Instrument Repair," combining elements of several existing skilled trades, in order to provide for the servicing of the complex instrumentation of many kinds of automatic equipment. The union protested and carried the matter to arbitration, where the ruling was that the plant contract as interpreted by the parties themselves for a number of years barred the company from unilaterally establishing the proposed new classification under the circumstances of the case.

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[3] The kind of automation applications represented by space craft have indirectly contributed to some jurisdictional problems at missile-launching sites, partly because some new kinds of work are involved and also because familiar kinds of work are performed in strange contexts and for strange purposes.

The point is that even the industrial unions tend to behave like craft unions with regard to jurisdictional lines in the skilled trades. This fact suggests that the basic source of resistance to this kind of change is not merely union policy but also the nature of the jobs involved and the attitudes engendered in the occupants. The skilled tradesman in the industrial plant, like the pilot or the flight engineer in the cockpit, has invested years of his life in training for his occupation, and his capability and contractual right to transfer to another occupation of comparable pay and status are usually severely limited. Hence, management's efforts to realign job duties to conform to the new requirements established by automation usually encounter stiff and sometimes bitter resistance. But the collective-bargaining problems are generally less difficult in the mass-production industries than in the industries where separate unions represent each skilled group. The industrial union rarely attempts to get detailed statements of job duties written into contracts (and thereby frozen at least for the life of the contract), and the factors of inter-union rivalry and independent strike power in the hands of several different groups are rarely present in industrial-union bargaining.

Thus far, the discussion has been concerned mainly with job combination or other realignment of those duties that survive automation. The collective-bargaining problems are often less difficult where specific jobs are completely eliminated by automation and no residual duties remain to be allocated. This has happened to a great many production-line jobs in manufacturing industry. Occasionally it happens to a skilled group represented by its own union. We find another example in the cockpits of certain airlines. Until recently, navigators have been required on most overseas airline flights. Small electronic computers have been installed in some cockpits, and, with the aid of certain other electronic gear, the computers are able to perform all of the functions formerly assigned to the navigators. The navigators' union threatened to strike when its contract with the airline involved expired, but the obvious and the only real issue was the amount of severance pay, if any, that the navigators should be granted. The settlement was generous, and there was no strike.

BORDER DISPUTES

The application of automation techniques often changes basically the nature of the human contribution to the production process. Engineering, designing, programing, and similar work gain in relative importance as manual machine operation by workers diminishes. Much of the engineering, designing, and programing work indisputably falls outside the conventional production and maintenance bargaining unit. But the increase in office and supervisory forces in most industries, accompanied by decline in the number of bargaining-unit employees, has stimulated a number of "border disputes"—cases where the union claims that new work related to the use of automation equipment should be assigned to bargaining-unit employees rather than to employees who are excluded from it. Most present-day collective-bargaining agreements in large-scale industry define the border lines between these two groups only in quite general language, and this fact has helped to make the resolution of some of these disputes difficult.

The nature of the problems involved can be illustrated by two of the many relevant arbitration cases. A rubber plant converted a mixing machine (known as a Banbury) to completely automatic operation. Formerly, an operator, and sometimes one or more helpers, had been required to weigh and add materials, to operate control levers, and to push start and stop buttons throughout the production cycle. The installation of automatic controls made it possible for the machine to operate for hours without human assistance after a punched card had been inserted in the control equipment, dials had been set, and a button had been pushed. The only attention that the operation required was periodic monitoring of the control panel for signals of unexpected trouble. The company assigned the monitoring function, the card handling, the dial setting, and the button pushing to a supervisor, who performed them in a control booth several hundred feet away from the automatic machine. He spent virtually all of his time on unquestionably supervisory duties such as the preparation of reports. The union claimed that the monitoring and button-pushing functions should be assigned to a bargaining-unit employee rather than to a supervisor.

The arbitrator ruled that the protested assignment was proper. He based his decision primarily on the fact that closely similar monitoring and button-pushing duties on semiautomatic systems had long been assigned to supervisors in the plant involved without protest from the union and no comparable work had ever been assigned to production employees. This plant assignment practice helped to establish the borders of the bargaining unit, he held. In the 1961 contract negotiations in the rubber industry, the Rubber Workers Union obtained from two of the major companies a contract provision to the effect that automation would not be used as a basis for removing jobs from the bargaining unit.

An automobile-industry case involved the programing of a newly installed, tape-controlled machine tool. The company had assigned the preparation of tapes for this machine to a production engineer, an employee not in the bargaining unit. The union claimed that this work should have been assigned to toolmakers, who are bargaining-unit members. The arbitrator held that the programing of such a machine is essentially the determination of its operational sequence and involves the computation of distances, locations, and angles; this type of work had always been part of the toolmaker's job, he said, and he concluded that it was a violation of the union-recognition clause of the contract to exclude the toolmaker entirely from the programing work.[4]

The increase in the number of these border disputes and the vagueness of most collective-bargaining agreements concerning the precise boundaries of the bargaining unit may prompt efforts in some contract negotiations to lay down additional guidelines, as in certain rubber-industry contracts in 1961. If the guidelines are to be really helpful in disposing of particular cases, they will necessarily be rather detailed and they will not be easily negotiated. Most companies and unions, therefore, may prefer to take their chances with their present indefinite language and to leave to arbitrators the task of deciding the difficult borderline cases.

WAGE DETERMINATION

Labor economists generally agree that one result of collective bargaining over the past several decades has been the development of a far more systematic approach to wage structures and wage-payment systems than was common in an earlier era. By considerably altering job content and by changing man-machine relationships in many industrial operations, automation is creating a need for reconsideration of some of the wage determination and wage-payment systems now in use.

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[4] A union official later commented that this decision would probably affect 100,000 jobs within the jurisdiction of the union in the country as a whole. To my mind, there is some question whether the decision will be as universally accepted and whether the ultimate number of programmers for machine tools will be as large as this comment seems to assume.

When output per man is sharply increased, as frequently happens in automation applications, the employees and their union may insist that this higher productivity justifies a higher wage rate even though the automated job may require far less physical effort and less skill than the predecessor job. In companies where wage-rate determination is not on a systematic basis, the productivity argument has sometimes been accepted. The fact that unit labor cost may be greatly reduced by automation and the desire to "buy" employee and union acceptance of the new technology have also been persuasive factors in the decision to grant higher wage rates. A series of such decisions, taken without regard to the emerging pattern, may result in an illogical wage structure and, perhaps ultimately, a crisis in bargaining.

A great many larger companies set wages on the basis of job-evaluation plans which assign rates on the basis of varying degrees of factors such as training, skill, responsibility, and working conditions. Such plans vary considerably in the relative weights which they assign to different factors. The prevalent plan in the steel industry, for example, gives much greater emphasis to responsibility factors than to skill factors; the most widely used plan in the metalworking trades and electrical manufacturing gives greater emphasis to skill than to responsibility factors. In the steel industry, changes in operating jobs resulting from automation have frequently been interpreted to increase the responsibility factors sufficiently to offset decreases in other factors such as working conditions and skill, so that wage rates have often remained unchanged or have increased. In some maintenance fields in steel, however, the companies and the union have found it necessary to negotiate what might be regarded as a modification of the usual application of the plan; an example is the new job of "electronics repairman."

Little information is available concerning the application of the evaluation plans emphasizing skill to jobs affected by automation. It seems reasonable to deduce, from the nature of automation, that skill requirements on production jobs would generally tend to decrease as higher levels of automation are achieved, and there are some case-study findings which lend support to this deductive conclusion. Hence, straightforward application of skill-oriented evaluation plans to production jobs affected by automation might be expected to reduce wage rates in a number of cases. Such a result could hardly be expected to create enthusiasm for the new technology or for the job evaluation plan. In one aircraft company which uses a large number of tape-controlled machine tools, the job evaluation plan has simply been ignored. Skilled tradesmen are assigned to monitor the operation of the machines and they are paid their established rates although many executives are positive that the skill of the tradesman is not needed for the work. Such a policy may lead ultimately to a substantial revision of the job evaluation plan rather than outright abandonment of it. Since job evaluation is usually a rather technical matter, it seems reasonable to anticipate that bargaining over the revision of a job-evaluation plan will frequently prove to be difficult.

INCENTIVE SYSTEMS

Various kinds of incentive-payment systems are widely used in American industry. In general, these systems provide for extra pay for extra production above a prescribed minimum. The general assumption, of course, is that extra effort results in extra production which justifies the extra pay. Broadly speaking, automation tends to transfer control over the rate of production from the worker to the machine; hence, it tends to undermine the basic rationale of incentive payment. This is a factor which has contributed to the increasing difficulties with incentive-payment plans experienced in many plants. Some time ago, the large automobile companies and the United Auto Workers recognized that incentive plans were poorly suited to most operations in the industry, largely because of the high degree of machine (or assembly line) control of the pace of work. Hence, incentive plans are rare in the larger automobile companies, and automation has not created for them the kind of problem under consideration here.

Some other companies in other industries have also moved away from incentive types of wage payment, sometimes with union assent and sometimes despite strong union resistance, sometimes in part because of the automation of operations and sometimes because of other considerations. Under some agreements, management has the right to make the decision whether an entirely new operation—for example, one performed on equipment that is substantially different from that used on the predecessor operation—is to be placed on incentive. It seems likely that some attrition of incentive plans will occur under such agreements as automation spreads.

A widespread practice under many incentive payment plans is limitation of output by the workers.[5] The degree of limitation varies quite markedly from one plant to another and even from one operation to another in the same plant. Some automation applications reduce the possibility of such limitation. It is not easy to eliminate completely all employee control over output, however; in some cases, such control is achieved simply by limiting the number of hours that the employees actually work during the scheduled shift. Automation commonly increases the amount of capital investment per employee and tends to make underutilization of equipment a more serious problem for management than under older types of technology. To meet this problem, some companies have fundamentally revised their incentive plans to provide for payment on the basis of the percentage of time that the employee (or the group) actually utilizes the equipment rather than on the basis of output. Another approach has been to make the production quota under the incentive system a matter of explicit bargaining between union and management representatives instead of leaving the matter to *sub rosa* unilateral determination by the employees involved.

GENERAL EFFECTS

The discussion to this point has considered primarily the direct and immediate effects of automation, carefully defined, on collective bargaining. This emphasis is not intended to imply that there are no indirect, long-run effects. They are much harder to assess, however. One reason is that, as one moves away from immediate and direct effects, it becomes increasingly difficult to determine the extent to which the observed developments are the result of automation (carefully defined) rather than other forces which are also at work. Moreover, since automation and collective bargaining are both relative newcomers in most industries in which both are found, most discussion of long-run effects rests far more on speculation than on experience. Some points of a general nature deserve attention, however.

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[5] The reasons for such limitation are diverse. Probably the most common are the fear of rate-cutting, the desire to spread the available work among as many employees as possible, and the desire to protect the average or below-average workman from unfavorable comparisons with high producers.

In a few situations, automation appears to be the principal factor in a substantial decline in the effectiveness of strikes. In the telephone and gas and electric utilities industries, which are the most notable examples, most operations have now been made so automatic that the little direct labor that is required to maintain essential services can be provided by supervisory employees in case of a strike. Most production employees are normally assigned to repair, installation, and maintenance work, much of which is simply postponed for the duration of a strike. It does not seem justifiable, however, to conclude that most unionized industries will soon reach the same level of automation and, therefore, that the strike will wither away.

In manufacturing as a whole, automation is one important factor in the decline over the past decade in the number of blue-collar workers and the rise in the number of white-collar workers. As has often been pointed out, this trend will result in declining union membership and perhaps declining union influence unless white-collar workers are organized in far greater numbers than at present.

AUTOMATION AND JOB SECURITY

As was pointed out at the beginning of this discussion, automation has become a subject of debate in an increasing number of collective bargaining negotiations during the past decade, but the term has been given an extremely broad definition. "Automation" has frequently been used to mean any development that causes displacement or unemployment in an industry or even in the economy generally. Obviously, many factors in addition to automation (carefully defined) cause displacement and unemployment. Among these additional factors are the decentralization of certain industries, the elimination of excess capacity in others, the growth of substitute materials, products, and services in many fields, the massive shift in emphasis in defense expenditures, and the lagging growth rate of the economy as a whole.

Other articles in this symposium discuss from various viewpoints the difficult question of how much of the recent increase in general unemployment is attributable to automation rather than to other factors. I will not go into that question, important though it is. The pertinent point for this discussion is that there is a widespread belief that automation is a new force in the economy which is decreasing job security and that collective bargaining in recent years has increasingly involved job-security measures. Thus, whatever its real economic impact, the psychological impact of automation has been an important factor in producing this new emphasis—or change in emphasis—in collective bargaining.

The result of this interest in job security has been an extensive repertoire of agreement provisions intended to prevent unemployment or to alleviate its effects.[6] Some companies and unions have tried to minimize unemployment by providing a number of aids to worker mobility—provisions for advance notice of major changes to permit joint planning, provisions for transfer to other operations or plants and broadening of seniority units, provisions for payment of moving expenses under certain circumstances, and provisions for training or retraining programs to be provided by the employer. For those whose employment is interrupted either temporarily or permanently, cushions have been provided—supplementary unemployment benefits, short work-week benefits, and severance pay. Early retirement benefits have been provided to encourage some voluntary withdrawals from the labor force. Some unions have demanded, with increasing urgency, reductions in the work week or the work year in order to spread the available work among larger numbers of people; and, in a few instances, unions have proposed job "freezes" to avert unemployment. Thus far, neither the hours-reduction nor the job-freezing proposals have made much progress in collective bargaining.

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[6] I do not intend to imply that all collective-bargaining agreements now include all of the measures discussed in this section. However, provisions of the kinds described are becoming increasingly common.

Another approach to the quest for job security has been for labor and management or the government to set up study committees to formulate recommendations for consideration in collective bargaining. Kaiser Steel and the Steelworkers have set up a tripartite committee, and the union and the largest companies in basic steel have a joint committee at work. One assignment of both committees is to consider ways of adjusting to technological change. The tripartite Automation Committee established in 1959 by Armour and two meat-packing unions is continuing its work. Several public boards have been appointed to study job-security matters (among other subjects) on the airlines. A tripartite Presidential Railroad Commission was at work, as 1961 ended, on recommendations for handling displacement and other problems of train-operating employees. Other less formalized studies were also under way in some other industries. By the end of 1962, we should know a great deal more about the efficacy of these varied approaches to a solution of the job-security problem under collective bargaining than we do at present. Even now, however, it seems safe to predict a considerable measure of agreement with the conclusion stated by the Armour Automation Committee in a progress report:

> Only through a coordinated approach in which public policy and private action mutually reinforce one another can the employment problems of technological change be met. Collective bargaining by itself cannot fully solve these problems.

CONCLUSION

Let us return briefly to the principal subject of this discussion, the direct and immediate impact of automation on industrial-relations systems. A superficial examination of the experience of the past decade might readily induce an optimistic view of the future. The spread of automation has created controversy and conflict over job rights, assignment of job duties, bases and methods of pay, and related matters. But with only a few exceptions, the controversy and conflict have been contained and resolved within the established institutions for negotiation and arbitration. We should not conclude too quickly, however, that the further spread of automation in the future will be accomplished with as little disruption of industrial-relations systems as in the past decade.

Up to now, the technical characteristics of automation have made it most adaptable to certain operations in mass-production industries.[7] The environment

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[7] Or to data-processing operations in which collective bargaining is rather rare.

Automation and the Management Process

By Thomas L. Whisler and George P. Shultz

Abstract: Automation of information processing has immediate effects upon management jobs and the management process of decision-making. The mediating instrument is the computer along with various mathematical and statistical techniques associated with its application to decision problems. Use of the computer places strong emphasis upon rationalizing and quantifying decisions. Many of these decisions are then incorporated into the machine, leaving managers to spend an increasing percentage of their time on problems involving interpersonal relations. Organization structure is affected. The number of levels tends to shrink, the grouping of activities to shift, and the structure of authority and control to become centralized. Society will feel the impact of these changes in large part through changing demands made upon the educational system and through possible changes in attitudes and behavior of the managerial group. An important aspect of this application of automation is that both the key decisions with reference to use of the computer and major impacts of these decisions fall on the managerial group, although different individuals may be involved in the two phases.

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THE impact of automation is not limited to effects on blue-collar and clerical jobs and workers.[1] A key characteristic of this new form of technological change is its relation to the concept of control. In its application to information processing, automation already affects and seems likely to widen its impact on managerial jobs and on the management process.

The characteristic of direct impact on management gives a new twist to the problems of introducing and adjusting to technological change. The familiar issues are present: who is to get the new jobs, how are training opportunities to be allocated, how are the gains to be shared, and so on. Issues of this kind have traditionally been decided by business managers, just as traditionally the people affected by their decisions have been blue-collar or white-collar workers. But, with automation, the managers themselves are directly affected along with others. The decisions made somewhere in the managerial group about automation will have an impact on the individual members of that group in varying degrees. Can a group change itself? What are the contours of the problem, and what issues are of special importance to society generally as well as to managers personally? These are questions that concern us here.

The piece of automation hardware most likely to change management jobs and the management process is the computer, with its ability to receive, store, and process rapidly large volumes of information. Especially when combined with various mathematical and statistical methods and when applied to decision-making, rather than to simple clerical automation, the computer is the basis for a new information technology that may be a vital part of the way organizations are run in the future.

The evidence to date indicates that the craft of management will be changed sharply in some areas, especially those activities related to decision-making. Traditional ideas of how to make an intelligent decision are challenged by the new technology. For example, how much information is it economic (and therefore necessary) to gather and analyze before reaching a decision? Much more in tomorrow's world than today's. How often should the firm refigure plans and strategies? Much more often after the computer arrives. How precisely and specifically is it possible—and necessary—to express a decision? Much more precisely and explicitly with the computer—to the extent that decisions may become almost uncomfortably visible from the manager's point of view.

Information technology built around the computer and focusing upon vital flows of information through an organization will rechannel these flows and, in the process, alter basic organization structure and change managerial jobs. It is here that managers may come face to face with decisions to inaugurate changes which can substantially influence their own lives.

EFFECTS ON ORGANIZATION AND JOBS

As the computer makes alterations in information channels, visible traces appear in the organization structure. In a specific application, it is possible, as some business firms have shown, to forecast the location and nature of organization changes once the new patterns of information flow have been determined.

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[1] Material presented in this article draws heavily on two earlier publications in which the authors were involved, as well as on their more recent research. The earlier publications are Harold J. Leavitt and Thomas L. Whisler, "Management in the 1980's," *Harvard Business Review,* Vol. 36, No. 6 (November–December 1958) and George P. Shultz and Thomas L. Whisler (eds.), *Management Organization and the Computer* (Glencoe: The Free Press, 1960). We treat here only a small segment of the range of issues presented by this topic and dealt with in the writings referred to above. For example, we do not take up such an important topic as the economics of the use of computers for purposes of management decisions.

Although the impress of the computer will vary from firm to firm, the general nature of its impact can be specified. The first wave of this impact will be upon: (1) the existing structure of organization in each firm, (2) the current bundle of jobs at the managerial level, in terms both of number of jobs and job content, and (3) the present structure of authority in the management hierarchy. From these changes we can then deduce some likely effects upon management job holders and upon the practices and activities which make up the art of administration.

Structural changes

Consider, first, structural changes in the organization. Formal organization structure reflects reasonably well the pattern of information flow necessary to accomplish the work of that organization. We can expect that when a new technique of handling information is introduced—especially one which channels the information into and out of a computer—the grouping of activities which makes up the divisions and levels of an organization structure will be affected. One effect would be to combine some currently separate activities and, perhaps at the same time, to separate other activities that are currently together. However, the first, the combinatorial effect, should be the stronger, since it is the nature of the computer to integrate and to encapsulate information flows. The tendency is to reduce the number of organization links.

In one company, integration has occurred at a high level, tying marketing activities closely into manufacturing. One consequence has been the replacement of the two former vice-presidents individually responsible for these areas, making one responsible for both. In another company, purchasing has been tied in directly with the responsibilities for controlling material flow for production planning. The organization shows a corresponding consolidation. In a third case, a company has brought together the control of warehouse inventories, granting of credit to customers, shipping of goods, and billing of customers, creating a new managerial position and substantially altering some old ones. An executive in still another firm which is moving rapidly into information-technology applications believes that the traditional grouping of activities in business with familiar titles such as sales and manufacturing will be completely replaced with new divisions and new titles which reflect the kinds of processes, and information flows, which fit neatly into the computer but which would not have been efficient groupings for men to attempt to manage.

Whatever the effect on departments, some effect on the levels of organization can also be anticipated. The number of levels may be reduced as activities are consolidated and the growth process of hierarchical organizations is, in effect, reversed. Remembering that the computer has a direct impact upon information transmission and analysis, we can anticipate that its greatest effect will be felt in those levels of the organization which, receiving information from within the firm and without, try to construct orderly plans of action from this information. In other words, the middle and upper reaches of management, rather than the lower levels and the nonmanagers, will be most affected.

A company in the middle of an extensive application of the computer to certain of its management functions has plotted the organizational changes it anticipates within a matter of months as a result of this application. Although a greater number of clerical than managerial employees will be displaced, the percentages are reversed. More than a third of the managers will be displaced while only about a fifth of the nonmanagers will be so affected.

Since the range of physical, blue-collar operations in a company is little affected by the applications we are discussing and since the volume and variety of information about the outside world relevant to management actions tends to increase through time rather than decrease, any shrinkage effect on the management organization structure will be uneven. While the middle may thin out, the top will burgeon, especially during the transition period when the new technologists of information cluster thickly about headquarters. The general effect, in fact, will be to slide most of the thinking and planning specialists toward the upper levels as their planning spheres become locked together and consolidated.

Management activity

A second major change will have to do with the job activities of many individual managers. A currently visible effect of the computer is the introduction into the business firm of individuals with skills unknown a few years ago. A great demand has developed for mathematicians and computer experts. People with strange titles such as "systems analysts" and "operations researchers" now adorn the management structures in many businesses. As a consequence of the activities of these newcomers, many of the traditional management jobs will be affected.

The manager of a newly consolidated (because of the computer) operation, who also had been the manager of some of these same operations under precomputer arrangements, reflected upon the changes in his own job. Much of the hectic day-to-day planning (or, perhaps more appropriately, "adapting") had been taken over by the computer. Certain facets of his job had been slighted previously under the pressure of crisis planning and improvisation. These were activities centering on interpersonal relations, either with customers or with his own staff. He finds that he now spends more time building a good staff and getting to know customers' needs than was possible in previous years, and, incidentally, he believes this to be more what he, as a manager, should be doing.

The new technology of information places increasing pressure upon the quality of information fed into it. By eliminating traditional time lags, misplaced information, conflicting decision rules, and unco-ordinated planning, which formerly necessitated frequent rechecking of information, it greatly enhances the importance of getting correct information into the system in the first place. The importance of feeding in correct information and of visualizing ways for improving the techniques of analysis will be reflected in an emphasis on these activities in the manager's job.

Authority and control

Perhaps even more significant than these visible organizational changes is the consequent alteration of the structure of authority and control. Control is a concept difficult to define and even harder to measure. But considering it as the power to establish decision rules for the organization, and to alter them in light of subsequent events, it is likely that the integrating and rationalizing force of the new technology will lead to a greater centralization of control within the business firm. It is important to keep in mind that the impetus for this centralization lies not simply in an effort to load fully an expensive machine but also in the computer's enormous capacity for very rapidly analyzing a wide range and quantity of interrelated data. It becomes feasible technically and, in many instances, sound economically to consider effects on a wide range of the firm's activities in making "small" planning decisions. To find the prototype of this kind of decision-making, one must look at the very small business in which one manager makes most of the decisions and, as best he can, assesses each decision in terms of its impact on the whole range of the business operations.

The best illustrations of this centralizing effect occur where operations researchers have been at work. In one major steel company, for example, regional managers formerly were charged with the responsibility for maintaining warehouse stocks of finished steel forms in sufficient quantity "not to disappoint our important customers—at least, not too often" and, at the same time, to minimize investment in finished goods inventories. Operations research specialists were able to provide top management of the firm a quantitative description of the relationship between frequency of failures to give service and dollars invested in inventory. Top management then chose the level of service it could afford to give to various classes of customers and thereby made the decisions on warehouse stocking for the regional managers. In another case, a multiplant manufacturer was able to schedule production and to order materials on a more efficient basis at headquarters, using computer programs, than the individual plants were able to do previously. The computer now generates better schedules than any group of individuals is able to produce and there is no longer any point in asking individual plant personnel to approve these schedules or edit them. Control in this sense has been centralized.

The economic aspects, as contrasted with the technical, is illustrated in another case in which an airline owning a central computer facility nonetheless maintained small decentralized reservations personnel groups because of the high cost of constantly feeding queries by telephone to the computer. When telephone tariffs were substantially reduced, the decision was made to pull all information and decisions to the computer. Control over reservations was thus placed in one spot and the organization was altered in the process of shifting this control.

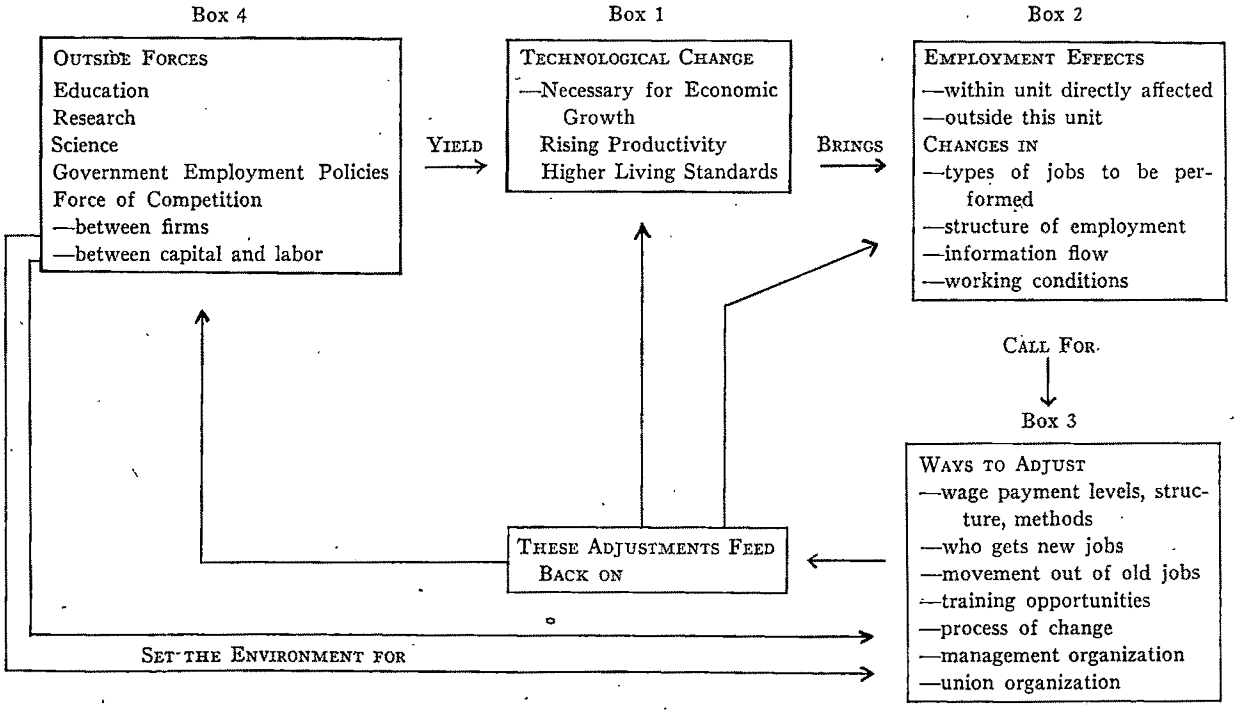
SOME ISSUES

A number of problems, many old and some new, are being generated by the appearance of information technology in American business. Most of these problems must be dealt with by business managers themselves, although their willingness and ability to deal intelligently with these problems may determine whether managers retain the authority to cope with them. Some others of a more long-run nature may be problems that society as a whole must face.

In considering both these types of problems, we have been impressed with the degree to which a given technological change, the problems and opportunities it generates, and the general economic and social setting are interrelated. Indeed, our format for studying these issues can be thought of as a large system of relationships and feedbacks, as shown on the accompanying diagram.

Some effects, as in Box 2 of Table 1, are virtual counterparts of the technological change itself; but those in Box 3,

TABLE 1—DIAGRAMMATIC REPRESENTATION OF THE FLOW OF FORCES SURROUNDING TECHNOLOGICAL CHANGE



including the dimensions of human adjustments to the effects of change, can vary widely. The success with which these adjustments are made feeds back not only on the direct effects in Box 2 but on the workability of technological change itself and on the broader social environment producing and sustaining such changes. And this environment, of course, is of vital significance to the feasibility of successful adjustments in any individual case. Thus, analysis of the effects of automation on the management process deals with an intricate and far-flung system of relationships. It is vital to recognize these relationships in any analysis of the impact of change. It is also important to recognize that some of the effects are a part of a transition process, while others are of a more enduring nature.

Jobs and skills

The transitional effects are familiar ones. One, which has occupied a great deal of attention already, is displacement of employees. Curiously, most attention has been centered upon displacement among clerical employees. The evidence indicates that, although clerks undoubtedly will be affected, perhaps the most difficult and persistent problems will arise from displacement of managers. Retraining and relocating those displaced will become someone's responsibility. The retraining problem, with its questions of the kind of training and the distribution of its costs, may be complicated considerably if many firms are feeling displacement effects at about the same time. American business has, by this time, had a great deal of experience in dealing with technologically displaced workers. The applicability to displaced managers of the lessons learned from this experience remains to be tested.

In addition to displacement effects, replacement problems must be expected. Changing job structures and skill patterns deriving from computer applications will shift the pattern of demand in the labor market at the managerial level. The responses of the market and the people in it involve the kinds of adjustments indicated in the right-hand side of our diagram. The fascinating aspect of these transition problems is that the decisions which will have to be made about altered organization structure and altered pay and status relationships will immediately and directly affect those charged with the responsibility for these decisions. Since specialization of labor exists at the management level as well as elsewhere in business, the costs and gains from the decisions made are likely to be unevenly distributed throughout the management structure, with a great deal of resulting organizational tension. The behavioral scientists, no less than the manager, should be closely watching the way in which these changes are actually accomplished.

Management and decision-making

Another source of tension is related to more centralized control over decision-making by managers in the lower and middle ranges of the organization. Historically, this same process swept through American business at lower organizational levels under the impetus of scientific management. The routinization of tasks and centralization of control over blue-collar jobs which this produced during the early decades of the twentieth century is partly responsible for the industrial relations problems of the last twenty or thirty years, including those involving the unhappy foreman whose job has been stripped of much of its content by personnel men and industrial engineers. The planning of one man's work by another has resulted in costs to individuals and to society not usually taken into account by those who accept the scientific-management philosophy. The computer experts seem in many instances to be moving the mistakes as well as the constructive purposes of scientific management to a higher level in the organization. Predictable problems, ignored in the early stages of this development, are sure to take their toll at a later date.

We believe that the kinds of managers to be found in the future business firm will differ from today's managers in important respects. As their skills and job requirements shift, so must their training, both in terms of intensiveness and in terms of particular specialities they choose. We expect that upper-level managers especially will receive substantially more formal education than the average manager today, thereby accelerating a general social trend. This change, along with emphasis upon fundamental theoretical knowledge, will make these men more like today's "staff" man and less like yesterday's boss in terms of behavior, attitudes, and interests. Focusing less upon internal relationships and control problems—thanks to these being taken over to a great degree by the computer—the future manager's orientation would be more that of the professional—outward-looking, interested in the problems of others in the profession, more visible to others, and probably more inclined to be mobile. It would be dangerous to apply this description to the whole range of the assumed structure of tomorrow's management, because it is far from clear as to how roles and relationships will be set up. But the emphasis upon rational problem-solving, and the increasing visibility of the decision process associated with the new technology, should doom to extinction most of the "organization men," if such have ever really existed.

Social implications

What may turn out to be the most important social effect of the new technology of business management stems from the changing demands placed upon formal training institutions. Business firms have been extremely vague in defining what they expect from colleges and universities, as recent investigations have demonstrated. But information technology should draw the lines more clearly and precisely. A great number of tomorrow's managers will be adequate only if they have the insights and understandings gained from graduate-level university training in physical and social sciences. At the same time, others lower in the hierarchy may need quite different understandings and skills—ones perhaps best gained in specialized training arrangements other than those associated with universities. Whatever the pattern that emerges, it seems likely that institutions outside the business firms will be more likely to be able to provide the individual with the kinds of preparation he needs for a career as a business manager than will the firms themselves. This is largely due to the declining value of low-level work experiences in the firm as preparation for high-level jobs as information technology increasingly centralizes control and differentiates work roles in the management structure.

Society's educational resources, already being shifted more toward professional and scientific training because of other environmental factors, may be expected to have to bear a new load as the business managers—an important group in the labor force—seek new ways of preparing themselves for managerial careers.

Thus, the educational and research institutions, which originally generated the thinking and technical developments resulting in a new technology of information, will themselves be modified as a consequence of the successful application of this technology. In this area, then, as in all the areas discussed above, we see a close pattern of interrelationships among direct effects of new technology, indirect consequences for organizations, and broad implications for important social questions. At the same time, these patterns are presented in new forms by the application of computers to management processes, where the agents of change are also among those directly affected.

Automation and Unemployment: A Management Viewpoint

By Malcolm L. Denise

Abstract: The relationship between automation and unemployment is widely misunderstood. More efficient use of labor through automation and technological advance is the basis of economic growth. It has not meant unemployment in the past, for displaced workers have been absorbed in other and better jobs. Contrary to a common assumption, automation today is not "displacing" workers more rapidly than in the past. Automation has preserved and increased, rather than reduced, Ford employment. We cannot identify any substantial group of laid-off employees whose unemployment is attributable solely to automation. Ford employment depends on sales, and there has been no consistent increase in units produced per employee. Recovery in auto industry employment after the 1958 recession was limited not by automation but by the market shift toward smaller, simpler, lighter cars which take less work to build. Automation does not lend itself readily to many operations, and it is not likely to advance so rapidly that accommodations cannot be made. Indeed, it will not be easy to maintain the historical rate of productivity increase. Efforts to explain unemployment as a result of automation have done much more to confuse than to advance the search for better solutions to unemployment problems.

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THE relationship between automation and unemployment is widely and profoundly misunderstood. Unemployment has remained near the 7 per cent level for the last year,[1] and everyone agrees that this is undesirable. Almost everyone agrees, also, that there is some connection between employment, unemployment, and automation. But there is very little agreement on just what this connection is.

Indeed, there is little agreement even on the meaning of the term "automation." When the word was coined in 1946 by a pioneer Ford manufacturing executive, D. S. Harder, it described a specific system for automatic handling of parts between successive production processes. Before long, however, the meaning of the term was completely out of his control.

In his book, *Automation and Management,* James R. Bright lists twenty-four definitions. He writes: [2]

> Few words of recent years have been so twisted to suit a multitude of purposes and phobias as this new word, "Automation." It has been used as a technological rallying cry, a manufacturing goal, an engineering challenge, an advertising slogan, a labor campaign banner, and as the symbol of ominous technological progress.

In popular usage, automation has come to mean nothing more than technological improvement—any development, however unsophisticated, that leads to greater productivity. When an obsolete plant is replaced by a modern, efficient one, many newspapers almost instinctively refer to automation, no matter how conventional the new plant may be. And when commodities are packed in oversize boxes before being loaded on ships, this, too, is described as automation.

This usage is not objectionable in itself, provided it is generally understood. "Automation" is much easier to say than "increased efficiency resulting from technological improvement." The word will be used in this broad sense here, except when explicitly limited to a narrower definition.

EASY CONCLUSIONS

The term "automation" has taken on an additional meaning that has no relevance to real life. Although no one actually defines it this way in so many words, automation is frequently used to mean anything that causes unemployment. Everyone has heard it said, as though it were true by definition, that, because we have too much unemployment, something must be done about automation.

It is easy to see how this confusion has developed. People have been deeply impressed by some of the more spectacular examples of automation that have been widely publicized in recent years. Everyone knows about engine blocks that are machined without benefit of human hands; everyone has heard of chemical plants that almost run themselves.

It is easy enough to jump from such examples to the conclusion that the wizards of the laboratories are on the verge of making people obsolete, and, indeed, already have begun to do so. When, at the same time, unemployment rises, it is perhaps only natural to conclude that our unemployment problems are the inevitable result of automation.

These easy conclusions have gained widespread acceptance. The result is that the very word automation calls to mind a mental picture of radical new automatic devices, spreading like wildfire, leaving behind a trail of useless, idle men.

There is no quarreling with the fact that automation often means more effective, efficient use of labor, with mechanical energy and automatic controls taking the place of some of the human energy and human direction that otherwise would be required. In this technical sense, automation frequently displaces labor, but such displacement is not synonymous with unemployment.

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[1] Written in November 1961.

[2] James R. Bright, *Automation and Management* (Boston, 1958), p. 4.

PRODUCTIVITY INCREASES

There is nothing new or mysterious about the substitution of mechanical for human energy. This is the basis of rising productivity, economic growth, and improved living standards. It always has been and always will be. The human energy released by technological gains is thereby made available for other productive work, and the evidence of the past tells us that the net result is not fewer jobs but more rewarding jobs.

Today, however, we hear that this lesson is no longer valid. Automation is proceeding so rapidly, according to some, that the economy is swamped with displaced labor that cannot be absorbed unless we take heroic remedies.

If we are, in fact, suffering from galloping productivity, then it may well be that automation is a prime cause of today's high unemployment. If this is not the case, however, then automation is just another name for our old friend, technological improvement, at least as far as its impact on employment is concerned. In this case, we must look for some other reasons to explain why the economy is now unable to make use of the available labor supply.

In fact, productivity is not increasing by leaps and bounds. The available statistics show that agriculture is the only major segment of the economy that has experienced an unusual jump in productivity during the last ten years.

WHY UNEMPLOYMENT?

If we cannot reasonably blame automation, then what is the reason for the high level of unemployment during the last year? One school of thought holds that the main reason is the recession which began in 1960, together with the usual lag in employment during the early stages of recovery. Another school holds that basic structural changes in the economy are responsible.

These two explanations are not mutually exclusive. There is no doubt that structural changes of various kinds have displaced workers in certain industries and areas. I believe, however, that if we can maintain a high level of business activity and a high level of effective demand, without inflation, for a number of years, then we will no longer have cause to worry about structural, or any other, unemployment problems.

The lack of any necessary causal relationship between automation and unemployment is illustrated by our experience at Ford Motor Company. After World War II, the management of Ford Motor Company decided that the company was not equipped to compete effectively, in terms of costs or products, in the buyer's market that was sure to follow the postwar seller's market. Among the steps taken to remedy this situation was an expansion and modernization program which involved the expenditure of over $2.5 billion on plants and facilities through 1957.

The company sought to provide its plants, both old and new, with the most modern and efficient equipment and processes for performing its various operations. By far the greater part of our so-called "Detroit automation" was installed during the period 1951–1957, with the bulk of it in operation by the end of 1954.

AUTOMATION AND FORD EMPLOYMENT

During this period, the company's production was expanding. It had been able to produce and sell less than one million vehicles in 1946, and only slightly more than that in 1947 and 1948, but by 1953 it produced almost two million units. Each year since, except 1958, it has exceeded that figure by varying amounts. Ford employment also was rising during the years when this automation was being installed. Consequently, the company was able to absorb seniority employees whose jobs had been affected by new processes and movements of operations, and who had not declined opportunities for other company employment, after only relatively brief periods of unemployment at worst.

Had we not made these improvements in efficiency, Ford Motor Company could not have prospered and grown; rather than having higher employment, it would have far less, and very possibly none. Because of these improvements, we have been able to market cars at prices that consumers are willing and able to pay, despite the fact that our labor costs for each hour worked have more than doubled since 1946. It seems clear, then, that the net result of the introduction of automation and other efficiencies in our productive processes has been to increase, rather than decrease, our employment.

CREATING NEW JOBS

A striking example of how improved technology can generate employment is furnished by Ford's experience in the manufacture of transmissions. In 1950 nearly all Ford vehicles had manual transmissions produced by the company. Some 3,100 hourly employees were engaged in their manufacture.

In subsequent years, improvements in design and in manufacturing technology brought automatic transmissions—vastly more complicated mechanisms—within the reach of the mass market. As a result, some 9,000 Ford employees were engaged in the manufacture of transmissions during 1960—about three times the number in 1950, while vehicle production had increased by only one eighth.

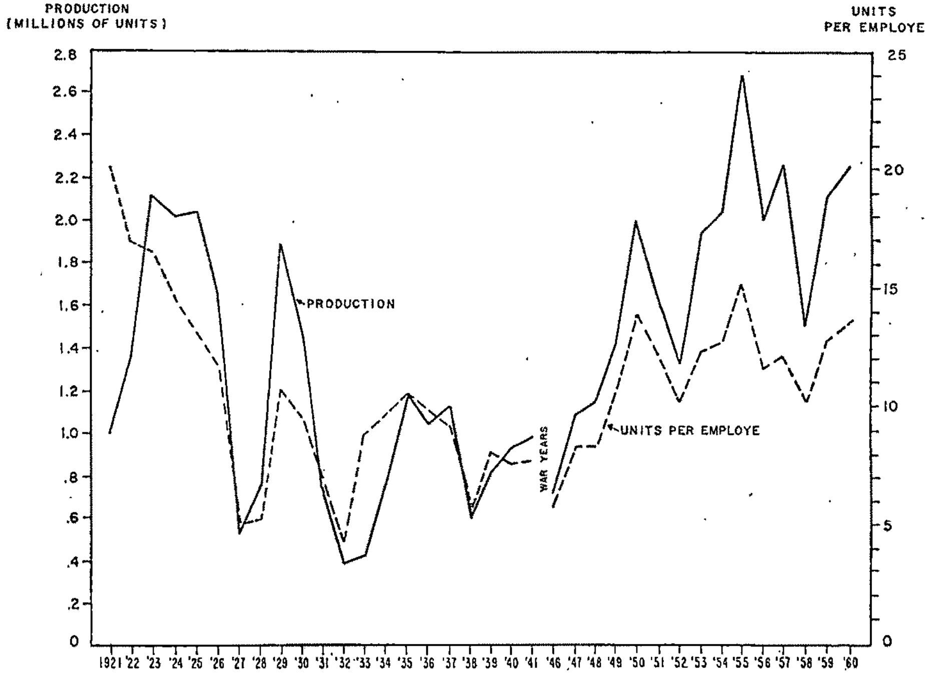
Our experience also has a bearing on the notion apparently prevailing in some quarters that people displaced by automation or other technological change constitute an identifiable group, with respect to whom separate policies can be formulated and applied. The fact is that, in a dynamic economy, people are constantly changing employment status and jobs for a wide variety of reasons. We have found it impossible to identify any substantial group of laid-off Ford employees whose unemployment is attributable solely to automation as such. Changes in processes and technology occur simultaneously with changes in demand, product design, product mix, and sourcing, with normal attrition in our work force and with other factors. All of these, in the aggregate, affect employment levels and placement opportunities, both company-wide and in particular plants.

But even if an accurate count of the immediately "displaced" were possible, it would have little, if any, significance as an indicator of automation's net effect on employment. The real measure of this would be the difference between the number actually employed at any given time and the number that would be employed at that time if no automation had occurred. The latter situation simply is not present to be measured. Clearly, we cannot use as a basis the employment level on the affected operations prior to automation. To do so would require us to assume that other unrelated factors had not affected employment in the meantime and, even more fallaciously, that buying decisions of customers are not influenced by the relative values available to them.

EMPLOYMENT DEPENDS ON SALES

To get back to Ford, what do the figures show about our employment? They

TABLE 1—FORD MOTOR COMPANY PRODUCTION AND UNITS PER EMPLOYEE, 1921–1960



show, in the first place, that total Ford nondefense employment increased from 124,000 in 1946 to 166,000 in 1960. If we exclude the Korean war years, the only substantial decreases in nondefense employment during this whole period occurred in 1958 and again beginning late in 1960. In both cases, layoffs were the result of sharp declines in sales, not of automation.[3]

In fact, the clearest conclusion emerging from our employment statistics is that Ford employment depends directly on our sales. Employment does not fluctuate as widely as sales, however, because our efficiency goes up as volume

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[3] It has been argued that Ford has maintained Company employment by absorbing work formerly done by other companies. According to this view, unemployment attributable to Ford automation is reflected in reduced employment levels in supplier firms.

Precise data to measure the effect of Ford make-or-buy decisions upon outside employment are not available. We can, however, compare the value of materials, supplies, and services purchased from outside vendors with the total value of Ford sales. This obviously does not measure changes in the labor content that goes into outside purchases. There is no adjustment for defense activities, and the data can be influenced to some degree by other factors extraneous to this discussion. With all of these limitations, the following table at least suggests that there has been no massive net shift of work from outside suppliers to Ford.

Year	Value of Purchases from Outside Vendors as a Percentage of Ford Sales
1950	58.5%
1951	58.7
1952	54.8
1953	58.8
1954	57.3
1955	56.0
1956	57.5
1957	59.8
1958	60.7
1959	53.7
1960	54.7

goes up, and vice versa. Table 1 compares total unit production by Ford Motor Company with the trend in annual units produced per employee on our rolls for the last forty years. This is not an index of productivity in a technical sense. It merely highlights the overwhelming influence of volume on the number of units produced per employee. For example, in 1946, when we produced only about 700,000 units, production per employee was about 6.5 units. By 1950, with production at 2 million, units per employee were up to almost fourteen. Since then, the trend in units per employee has consistently followed the trend in total units.

During the early postwar years, 1946–1949, production and units per employee were relatively low. The fact is that Ford was a very inefficient company immediately after the war. It was losing money rapidly and probably would have gone straight into bankruptcy if we had not succeeded in raising efficiency substantially. Because our efficiency was abnormally and dangerously low during these early postwar years, the use of data from this period as a benchmark for comparing changes in employment and production during the entire postwar period would be highly misleading. After 1950 we no longer had the opportunity to achieve the same sharp gains in efficiency as those that occurred between 1946 and 1950.[4]

PRODUCTION PER EMPLOYEE

The chart points up the fact that, in spite of all the talk about bigger production with fewer employees, there has been no consistent increase in unit production per employee. For example, in 1960 we produced about 13.5 units per employee, slightly fewer than in 1950, and about the same as in the mid-1920's. General Motors has reported similar experience. In testimony before the Senate Special Committee on Unemployment Problems in November 1959, Mr. Louis G. Seaton, Vice-President, General Motors Corporation, said:

> Contrary to popular impression, mechanization—or "automation"—has not reduced the amount of man-hours that go into building a General Motors automobile. The reason is that the greatly improved cars and trucks of today are mechanically more complex and hence more complicated to produce than their counterparts of even a few years ago. Thus, while mechanization and improved processes have reduced man-hours on some operations, improvements, resulting in increased complexity of the vehicles, have been an off-setting factor. Accordingly, the number of cars produced per employee per year has remained substantially constant over the years—10.9 cars in 1949 and the same number in 1958.

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[4] Similar comparisons for the industry as a whole are equally misleading. For example, U. S. Bureau of Labor Statistics employment figures for the Motor Vehicle and Equipment Manufacturing Industry show that employment rose only .6 per cent from 1947 to 1960, while vehicle production rose 64 per cent. But the same series also shows an employment increase from 1940 to 1947 of 45.9 per cent as against a production increase of 7.3 per cent. Moreover, it shows an employment increase of 18.6 per cent between 1940 and 1958—the lowest production year of the fifties—in contrast to a rise in vehicle production of only 14.8 per cent.

The foregoing suggests that such comparisons must be approached with some caution. Another reason for caution is the fact that the Standard Industrial Classification system used by the government in compiling employment and certain other statistics does not include in the Motor Vehicle and Equipment Manufacturing Industry large numbers of persons—whether employed by the major producers or by supplier firms—who in fact are employed in manufacturing vehicle components, and it undoubtedly includes some who are not.

This is not intended as a criticism of the government's classification system; it simply reflects the fact that the product is heterogeneous, involving outputs from many industrial classifications.

A CHANGING MARKET

Much has been made of the fact that, since the 1958 recession, automobile employment has returned only to about the 1957 level, in spite of the fact that production in 1960 was higher than in 1957. Since there has been relatively little new automation in the industry since 1957, the explanation must be found in other developments. The principal reason is that the auto market has changed radically since 1957.

Until that year, growing sales were accompanied by growing employment, in spite of increasing efficiency, because consumers were demanding, and the industry was building, more car per car—bigger, more powerful cars, with more automatic equipment and more luxury accessories. Because of technological advances, the industry was able to provide more car per car with only moderate price increases.

In 1957 medium and higher priced cars accounted for 37 per cent of United States passenger car production, and the one compact make accounted for less than two per cent. In 1960 medium and higher priced cars accounted for only 24 per cent of production, and ten compacts accounted for 29 per cent. In 1957, 83 per cent of the cars produced were equipped with eight cylinder engines; in 1960, only 57 per cent. The percentage equipped with automatic transmissions fell from 80 to 73 per cent. Obviously, smaller, simpler, cheaper cars, with fewer accessories, take less material and less work to build. Again, therefore, the lesson is clear: employment in our industry depends, in the last analysis, on the consumer.

So far, I have been trying to demonstrate that automation cannot be isolated as a cause of unemployment. Indeed, it seems self-evident that automation and other improvements in efficiency lead to employment, not unemployment. People are more likely to lose jobs in companies and industries that are falling behind competitively, that are inefficient and have meager profits, than they are in those that are efficient and profitable.

AUTOMATION AND EFFICIENCY

How does an enterprise become efficient and profitable? How does it stay efficient and profitable in an increasingly competitive world? First of all, it must produce a commodity that customers are willing to buy in considerable volume at a price that is in line with the prices of competitive products and that yields a profit sufficient to attract investor capital.

No company today can meet these goals without relying heavily on automation, again defined in the broadest sense. To the extent that our economy automates, we will continue to have a sound basis for rising national income and a rising standard of living. To the extent that we fail to automate, nothing else we do can protect us from shrinking markets, economic stagnation, and difficulty in finding work for all those willing and able to work.

Is it possible that the economy may automate too rapidly in the future—so rapidly that it does become impossible to reabsorb in other jobs the workers who are displaced? My own impression is that this is not very likely. Many types of automation are expensive and can add costly rigidities to productive facilities. The decision to automate or not is seldom clear cut. Frequently, at least in my industry, the gains do not appear worth the investment. As I have already pointed out, the major advances in our own facilities were completed more than five years ago. Since then, advances in automation have been slow, though steady.

LIMITS ON AUTOMATION

Many kinds of manufacturing and assembly operations do not lend themselves readily to automation, especially where the product is varied and subject to frequent change as it is in the American auto industry. As a matter of fact, in some operations, notably stamping, we have been forced to reduce the degree of automation in order to obtain greater flexibility in responding to changes in consumer demand.

It is often said that, somehow, automation will require greater stability of demand, in terms of both quantity and variety of products. It seems to me that this is an upside-down view of the dynamics of a free market. Ford is a big company only because customers have freely decided to buy our products. The company's fate will continue to rest on this foundation. Only by doing whatever is necessary to win the favor of customers can we remain a healthy, vigorous, progressive enterprise. We cannot afford the kind of automation that will limit our ability to respond to consumers. It is much more likely that the characteristics of demand will continue to limit the rate, and influence the type, of automation, rather than the other way around.

Another factor that limits the rate of automation is the human mind. Substantially more rapid progress depends on the more advanced automation techniques—electronic controls, feedback, numerical programing of machine tools, and so on. People who can design, install, and manage the use of advanced automated facilities are still in very short supply. We have an even shorter supply of the kind of imagination and foresight that can appreciate the possibilities that science lays before us. It will take a good many years to develop the attitudes and outlook that will make rapid automation both feasible and profitable. In short, we may automate too slowly rather than too rapidly.

HISTORICAL PERSPECTIVE

In thinking about the future, it is often helpful to look back at the past During the last sixty years, the American economy has had the benefit of advances that would have seemed fantastic if anyone had had the foresight to predict them in 1900. The list includes the substitution of electrical and internal combustion motors for human, animal, and steam power, and of petroleum and natural gas for coal and wood, the tremendous multiplication of electrical generating capacity, the development of highway, air, and pipeline transportation, the burgeoning of the assembly line and other mass-production techniques, the application of science and mechanization to agriculture, the systematic study of management principles, the enormous growth of the engineering profession, explosive developments in physics and chemistry. Each of us could name a thousand things more that were beyond the wildest dreams of our own fathers.

As a result of these developments, together with a vast growth in capital investment, we have managed to increase our productivity, as measured by output per man-hour, at an average rate of about 2.2 per cent per year in the total private economy. To permit a similar rate of productivity increase over the next fifty or sixty years, we must have new developments as dramatic, as far-reaching, as inconceivable as the developments of the past sixty years would have seemed in 1900. Work will not soon be obsolete because we have learned how to build computers and employ electronic controls. Indeed, it will not be an easy or a simple task even to maintain the past rate of productivity increase from our present high base.

COMPLEX RELATIONSHIP

The relationship between automation and employment is highly complex. Automation has positive as well as negative effects on employment. Neither can be isolated from the influence of other factors operating at the same time.

People lose jobs for a multitude of reasons, reasons that are not mutually exclusive. Usually a number of them are interacting simultaneously. These reasons include changes in technology, replacement of obsolete facilities, shifts in the location of major market areas, changes in plant layout, competition from foreign producers, development of substitute materials, reorganization of work, elimination of featherbedding, management incompetence, changes in consumer tastes, fluctuations in business activity. The list could be extended indefinitely. It would have to include the failure of employers to automate or otherwise improve efficiency so as to remain competitive.

Efforts to explain current unemployment as a result of automation have done much more to confuse than to advance the search for better solutions to unemployment problems. A stable, high level of employment can be achieved only in a vigorous, dynamic, growing economy. Any program to preserve jobs that would penalize or limit the introduction of automation or the modernization of plants and equipment would be self-defeating. In the effort to freeze existing jobs, it would destroy the conditions that create new jobs.

CONCLUSIONS

We sometimes tend to forget how much has already been accomplished by industry in developing programs to minimize the effects of displacement and to alleviate unemployment. In Ford Motor Company, these include Supplemental Unemployment Benefits, training and retraining programs, seniority preferences in determining the order of layoffs and recalls, preferential hiring arrangements covering Detroit area plants, early retirement arrangements for permanently laid-off employees approaching normal retirement age, separation payments, and transfer of employees affected by movement of operations. The collective bargaining agreement recently concluded between Ford and the United Automobile Workers (UAW) provided for substantial improvements in many of these arrangements—most notably, for large increases in the amount and duration of Supplemental Unemployment Benefits and for moving expenses.

Retraining programs carefully tailored to the needs and abilities of individuals and to known job opportunities can be of some help in reducing long-term unemployment. Experience has shown, however, that a high proportion of the chronically unemployed are disqualified for such training by inadequate general educational background. The uneducated worker is a handicapped worker in the truest sense of the word. Adult education and training programs may help him to overcome his handicap. But it is more important that our young people not continue to enter the labor market with this handicap in such appalling numbers as are now projected. In the long run, continuing improvement in the education of American youth is one of the most important of all possible contributions to the prevention of long-term unemployment.

The basic condition for a high and stable level of employment is a steadily expanding economy. There is no easy formula that will guarantee this result. Timely use of the government's fiscal, monetary, and other tools to moderate business fluctuations is essential. Other essentials include avoidance of inflation, emphasis on technological advance and increased efficiency, and improvement in the skills and abilities of our labor force. Finally, I believe that a faster rate of growth must be accompanied by increased capital investment and more research and development. In my opinion, tax revision to provide greater incentives for capital investment and research and development would be highly desirable.

Policies for Automation: A Labor Viewpoint

By Walter P. Reuther

Abstract: Labor has no quarrel with technology itself. Its criticism goes to the quality of social imagination brought to bear upon problems created or aggravated by technological change. Technology has lately aggravated an already serious imbalance between productive capacity and effective demand. It has contributed to a decline in manufacturing employment which has not been made up by rising employment in other sectors. The situation will deteriorate still more with further automation and increases in the potential labor force, in the absence of private and public policies which assure a national growth rate commensurate with full employment of our physical and human resources. Industrial workers have borne the brunt of automation's impact. The transitional problems of displaced workers must be solved by the whole community, because the whole community benefits from the process of technological development and because the losses resulting from unemployment are social as well as personal. Solutions must come both from collective bargaining and from public programs. Labor and management have only begun to deal with the problems of wage-earners in an environment of rapidly changing technology. Even at best, however, collective bargaining can bring only partial solutions. Federal action is needed in a variety of fields. Also needed is revision of the ground rules governing corporate behavior in the matter of administered price increases and plant relocation.

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IN a paper presented in December 1959, to an annual meeting of the American Association for the Advancement of Science, Norbert Wiener made the point that "machines can and do transcend some of the limitations of their designers, and that in doing so they may be both effective and dangerous."

Mr. Wiener cited machines which, after ten to twenty hours of learning how to play checkers, "can show a marked superiority to the player who has programmed them. . . ." Professor Wiener's concluding thought was: "We must always exert the full strength of our imagination to examine where the full use of our new modalities may lead us. . . ."

The appeal of Professor Wiener's illustration today lies in its simple understatement of a fundamental truth, borne in upon this generation in matters of far greater scope and consequence than an innocent game of checkers. In the nuclear balance of terror and in the workings of the civil economy, we have had and continue to have ample evidence that the technology developed by man's ingenuity can be both effective and dangerous. To consider only the economic sphere, we have in recent years, coincident with the rapid advance of automation, experienced a series of recessions with attendant mass unemployment, a rise in chronic unemployment, and a lagging rate of economic growth that has deprived us of essential goods and services and left us ill prepared for mounting population pressures and world responsibilities.

Labor's criticism has not been directed at technology itself, at its past record or potential promise, but, rather, at the quality of social imagination that we as a nation have brought to bear upon the problems created or aggravated by technological change and at the failure of private and public decision-makers alike to take sufficient account of the human impact of economic and technological development on the immediate lives of wage-earners, their families, and the communities in which they live.

EFFECTS OF TECHNOLOGY

Whatever technology has been or will be; the fact is that for several years it has been a highly unsettling factor in an economy already characterized by a serious lack of balance between productive capacity and effective demand—and this imbalance may be expected to become worse in the coming decade unless we succeeed in developing a combination of private and public policies to assure full employment and a substantially higher rate of economic growth.

There are many things we do not presently know about the impact of automation. It is true, as management spokesmen have lately argued, that it is impossible to isolate the precise degree to which automation accounts for the level of unemployment. Remedial action, however, need not and must not wait upon a refinement of our statistics. We know that improved technology, by definition, has the effect of displacing human labor. We know that the men displaced in one work place, industry, or area must be absorbed elsewhere to remain employed as workers and effective as consumers. We know that production has risen and employment has declined in many industries. From 1953 through 1960, there was a 17 per cent increase in manufacturing production, with an accompanying decrease of 1,600,000 production workers. In the first half of 1961, the total number of man-hours for production workers dropped 5.4 per cent below the last half of 1960, with virtually no change in manufacturing output.

We know that employment has not risen fast enough in other sectors to make up for the decline in manufacturing and provide jobs for those newly entering the labor market. Proof lies in a rate of unemployment which, despite many months of economic upturn since the last recession, still exceeds 6 per cent.

We know, what is more, that the situation, in the absence of more forthright action, is a deteriorating one. In the decade of the 1960's, the labor force will be increased by some 13.5 million workers. Some 28 million workers will be displaced by further technological innovation. The American economy will, therefore, have to create over 40 million new jobs in ten years, or an average of 80,000 new jobs every week of the decade if we want a growth rate commensurate with the full employment of our physical and human resources. In the words of Representative Elmer J. Holland, who conducted a congressional inquiry into the impact of automation on employment, we are producing more workers than jobs.

THE UNEMPLOYMENT PROBLEM

The net effect of present official measurements is to understate the level of unemployment. The labor force is defined for the purpose of Bureau of Labor Statistics reports essentially as consisting in those who either have some relationship with an employer or are actively seeking work. Such a definition minimizes the flexibility of the labor force, which expands and contracts significantly with fluctuations in economic activity.

Much of the unemployment associated with automation, therefore, is hidden. Many men and women who have been displaced from former jobs retire from an active search for jobs when economic activity is low. Their unemployment—although it affects the well-being of these families, the volume of new wealth created, and the level of market demand—is not effectively revealed under present survey techniques.

Again, when a particular employer indicates that certain operations have been automated without layoffs, automation may nevertheless be contributing to hidden but genuine unemployment. In such instances, the job loss is suffered not by workers who were not fired but by those who, because of the increased efficiency of the new equipment, were not hired.

Large employers in the automobile industry have absorbed into their own operations many operations formerly done in independent supplier plants. Such a concentration may save jobs for workers among the major producers, but, given the growing efficiency of the new tools, not nearly enough to compensate for the job loss incurred when smaller suppliers shut their doors or curtail production. In the auto industry as a whole, employment opportunities have been consistently declining since 1955.

When an employer automates, he does not necessarily or even commonly do so by renovating an old plant. He more frequently decides that it will be more profitable to build an entirely new plant designed for the new machinery, and quite often located in another area more accessible to sources of supply or developing markets. The new technology has thus played a considerable role in the trend of industrial decentralization. And the combination of automation and decentralization has played havoc with wage-earners and their communities.

A point frequently ignored by those so entranced with automation's long-run promise that they lack interest in the immediate consequences of its introduction is that the wage-earner displaced from a job by new equipment or methods or by plant migration or closing cannot count on finding another job without delay, financial loss, manifold personal and family difficulties, or even a permanent decline in income and living standards.

WHO SHOULD PAY THE PRICE OF PROGRESS?

Here we encounter not so much a failure of technology as a paucity of ideas. Until recently—the notion still persists in some quarters—a leading response to the immediate dislocations and hardships caused by economic and technological change was an assertion that such matters were the inevitable price paid for progress. Such a response, wage-earners and their unions argued, obviously begged the question of whether industrial wage-earners and their families, who were currently paying most of that price, should continue to pay it or whether the price could not and should not be borne more equitably by the whole society, since presumably the whole society is to benefit from the changes under way.

This conflict—between a tag-end faith in eighteenth-century notions of a natural economic harmony and the worker's conviction that democracy, in the industrial sphere, has to mean a proper respect for individual dignity, well-being, and job rights in the here-and-now—has focused recent collective bargaining on changes necessary to lighten the burden of economic insecurity that bears so heavily on the industrial worker and his family in the age of automation.

Emerging from labor-management confrontations in the steel industry, in autos, in meat-packing, longshoring, and other industries where technological change, whatever its long-term possibilities, is destroying the immediate job security of workers, is a growing awareness within government and among the more responsible employers that (1) the social and economic costs of rapid technological change cannot and must not be borne alone by the wage-earners, families, and communities directly affected; (2) that the short-term, transitional problems of adjustment to accelerating technological change demand a repertory of solutions, some of which can be found in collective bargaining, others through government programs.

COLLECTIVE BARGAINING SOLUTIONS

The solutions that are beginning to be found through collective bargaining are logical extensions of ideas that have been implicit in the evolving relations of free labor and free management for a generation. The basis of collective bargaining itself is the acknowledged right of workers through their unions to share in those decisions which influence the terms of employment.

The scope of collective bargaining has broadened considerably since that basic right was incorporated into law and confirmed in the work places with management's recognition of industrial unions a generation ago. Through union recognition, seniority rules, grievance procedures, paid holidays and vacations, health and unemployment insurance, pension programs, wage increases linked to productivity gains and related to the cost of living, and other contractual provisions, wage-earners have gradually and painfully built a structure and a concept of job rights as meaningful in contemporary terms as those of property rights, first developed in an agricultural economy before the industrial revolution separated the elements of ownership, management, and labor.

In practice, then, if not always or sufficiently in principle, industrial management has acknowledged, in one area of collective bargaining after another, that job rights are the property rights of wage-earners. It remains in the years ahead for management, labor, and the general public to realize the implications of this trend in terms relevant to an economy more and more complex, more and more mechanized, more and more interdependent within and beyond national frontiers.

Labor and management have begun to deal with the transitional problems of wage-earners threatened by layoff or displacement. In the longshoring industry, where new methods of handling cargo are drastically reducing work crews, a special fund has been set up to supplement wages lost through mechanization and to provide for earlier retirement. Armour and Company has negotiated with the United Packinghouse Workers and the Amalgamated Meat Cutters and Butcher Workmen a provision known as Technological Adjustment Pay or TAP, which provides for three-months' notice of impending shut downs, transfer and severance pay and increased pensions for workers of fifty-five or older with twenty years' seniority if they choose to retire. Armour had earlier reached agreement with the unions on a retraining program.

The International Ladies Garment Workers Union is advocating an employer fund for payments to displaced workers.

UAW AGREEMENTS OF 1961

The United Auto Workers Union (UAW) in its 1961 collective bargaining with the major auto companies made significant progress in providing increased protection for workers either permanently or temporarily displaced from their jobs. Separation pay was substantially liberalized, with payments ranging from fifty hours' pay for a worker separated after only two years of service to 1,500 hours' pay—an amount approaching an average year's earnings—for a worker with thirty years' seniority. Moving allowances will now be paid to workers transferring with their jobs to another plant of the same employer. The levels of employer-paid unemployment benefits, which supplement the grossly inadequate benefits paid under state systems, have been substantially increased, and their duration has been extended to a maximum of fifty-two weeks. Full payment by the employer of the cost of hospital, medical, and surgical care has been provided not only for employed auto workers but to extend through up to a year of layoff.

A particularly significant step toward increasing the security and the human dignity of the industrial worker who traditionally has been employed—and paid—by the tenth of an hour has been the negotiation in the major UAW agreements of a short-week unemployment benefit, which pays him 50 per cent or 65 per cent—depending on the nature of his layoff—of his regular hourly pay for hours of idleness when he is given less than forty hours of work in a week. Thus, by recognizing the principle that the hourly paid worker is entitled to compensation, even at a reduced rate, for every hour of his normal working week, whether or not the employer makes a call upon his services, he is given a status and a recognition of his human worth much closer to that which is taken for granted by most salaried workers. The present distinctions in business practice between wage and salary workers are both invidious and inequitable. They lack justification in a modern democracy which is striving toward the goal of equal rights and equal opportunity in the economic sphere as well as in political life.

One of the tragic human problems created by the new technology is that of the worker nearing retirement age who is too old to learn the new skills or new work patterns required by new machines. Under UAW agreements, such workers—or those who for other reasons elect to do so—may retire at age sixty with a pension benefit very nearly equal to the combined income they will begin to receive at age sixty-two from the pension fund and social security.

UNMET PROBLEMS

Although the new UAW agreements have provided useful answers to some of the problems created for workers by advancing technology, we were not able to achieve all the goals which we felt and still feel to be desirable and necessary. Apart from the provision facilitating earlier retirement, we were unable to persuade employers of the need to create new employment opportunities by the negotiated reduction of working time. We had suggested several possible means of achieving this end, including the control of overtime, industrial furloughs or sabbaticals, longer vacations, more paid holidays and reduction of the workday or work week without loss of pay. Traditionally, Americans have taken part of the fruits of increasing productivity in the form of greater leisure, and it is far better that workers should enjoy the planned, compensated leisure of a negotiated program than that they suffer the unplanned, uncompensated, and soul-destroying idleness of unemployment.

It is clear that labor and management have only begun to explore the possibilities of increasing both job security and job opportunity—especially the latter—through collective bargaining. It is equally clear, on the other hand, that neither workers nor the country as a whole can afford to wait while this exploration continues, as it will and must. Unemployment, while it attacks the worker first and hardest, has an obvious effect on the whole nation. As a national problem with national scope and consequences, it calls for a national response through the instrumentalities of government. Structural unemployment, moreover, stemming from the changing nature of whole industries and affecting whole regions, is beyond the reach of collective bargaining and requires public solutions. Most unemployment, in any case, has its ultimate source in the prevailing habits, policies, and relationships that govern our economy and which have, in recent years, kept it too far below the level of its maximum performance.

The clear responsibility of organized labor and management is to do what can be done at the plant, corporation, and industry levels to stabilize employment, to solve the transitional problems of income maintenance, retraining, and moving of displaced workers and their families, and to create new employment opportunities by carefully prepared programs for reduction of working time.

LIMITATIONS OF COLLECTIVE BARGAINING

Experience thus far, however, already demonstrates the ultimate futility of expecting from negotiated agreements between labor and management more than a partial solution to a dilemma that requires the combined awareness and action of individuals, labor and management, and government.

Labor intends to assure the employment security of wage-earners, insofar as it can be assured, through collective bargaining. Union leadership is sharply aware, however, that efforts toward that end will not arrest the further decline of employment in manufacturing and that it is illusory to expect to build tight little islands of security surrounded on all sides by forces and practices that make for instability, fitful cycles of recession and boom, and a continuing failure to live up to our economic potential.

The problem of declining job opportunities as automation advances extends, for example, far beyond the confines of the automobile industry, and we in the UAW have advocated the need for a frontal attack upon it through national policy as expressed in the hours-of-work provisions of the Fair Labor Standards Act.

We recognize, at the same time, that this is not a simple problem and that it involves a seeming conflict of national interests. On the one hand, we are all too well aware of the vast social and individual needs which must still be met at home and abroad and which ought to be able to absorb all the goods and services our economy could possibly produce. We understand the position taken by Senator—now President—Kennedy when, in discussing a proposal to reduce the standard work week as a means to increase employment opportunities, he said: "My own feeling is that I would prefer a different solution. I would prefer the solution of this economy going ahead at such full blast that in a 40-hour week we would barely produce what we could consume. . . ."

Later, the President elaborated that view at a press conference in which he said:

> . . . I would say that I am opposed to a shorter work week. I am hopeful that we can have employment high five days a week, and forty hours, which is traditional in this country, and which is necessary if we are going to continue economic growth, and maintain our commitments at home and abroad. So that I would be opposed to any arbitrary reduction of the work week, and I am unhappy when I see the work week reduced artificially, in the sense that the pressures of a declining economy reduce it, so that we get averages of 38.5 hours a week instead of the forty hours a week. . . .

We can understand that view, but it is acceptable only to the extent that we do succeed in moving rapidly toward full production and full employment—and we are not yet doing so. It is difficult to explain to unemployed workers that national objectives require all the man-hours available through a forty-hour week while they can find no hours of work at all. They see only that, if hours of work were reduced, there would be more jobs for them and the other unemployed.

FLEXIBLE WORK WEEK

The obvious solution to these conflicting views is to provide for a flexible adjustment of the standard forty-hour week based on the level of unemployment, so that it can stand at forty hours when we have full employment, and are therefore making full use of available man-hours, and can be reduced whenever we find we are wasting man-hours through unemployment. A sliding scale of standard hours, based on the percentage of the labor force unemployed, would be written into the Fair Labor Standards Act.

Such legislation would have to provide for maintenance of purchasing power despite reductions in the standard work week, otherwise it would merely be a mechanism for spreading economic hardship more evenly over the working force. Since unemployment reflects a deficiency in consumer demand, creation of more jobs through reductions in the work week while maintaining weekly pay would automatically bolster demand and so help to restore balance to the economy.

Where would the additional money come from? When unemployment is high, the individual employer, and especially the small employer, is least able to assume an increased wage burden. We have, therefore, proposed that such burden be assumed not by the individual employer but through a National Work-Week Adjustment Fund to be accumulated out of the revenue of a small payroll tax on all employers.

This method of financing would have a stabilizing influence on the economy; since it would tend to draw money into the Fund in good times when demand is high, and, in bad times, when demand needs a stimulus, the money would be available to increase purchasing power. The cost of the proposal, when spread over the entire business cycle, would require only a small tax on payrolls, and this cost would be offset to a significant degree by reduction in costs now arising out of unemployment.

Most of that cost is now borne by those who can least afford it—the unemployed workers and their families. Considerable costs are borne also by taxpayers in the communities hard hit by unemployment and rising welfare expenditures.

But far greater than all the direct monetary costs of unemployment are the indirect costs which are represented by the lost wealth which unemployed workers would have been creating if they had been given the opportunity to do so. This tremendous cost is borne, in the last analysis, by all of us, business included. If a small tax on payrolls can help to stabilize our economy, moderate recessions, and maintain full production and full employment for longer periods, it will be one of the soundest investments business has ever made.

Industrial workers in the circumstances of this second half of the twentieth century must seek legislative remedies for their economic troubles when it becomes apparent that collective bargaining alone will not provide sufficient answers. To do so, they feel, is only to exercise the privileges and responsibilities of citizenship in a democratic society. In relation to our present pressing problems of unemployment, the individual's responsibility is to understand the dimensions and urgency of these problems and to impress his elected representatives with that understanding. The responsibility of government is to reflect that understanding in policy which, to put it simply, will give substance to the commitment already formally undertaken in the Employment Act of 1946 to help to achieve the goals of maximum employment, maximum production, and maximum purchasing power.

RESPONSIBILITIES OF GOVERNMENT

This commitment of democratic government has for many years been more honored in the breach than in the observance. In the task of fulfilling the commitment, there are two orders of magnitude. One involves a repertory of specific actions to supplement efforts made in what is conventionally called the private economy—as if what happened in that sector somehow was not decisively and intimately "affected with a public interest." The other involves a more basic examination of the economy in which we live.

Examples of measures of the first type would be the amendment of the Fair Labor Standards Act to provide for the flexible work week described above; a national program for the retraining of displaced workers, the maintenance of such workers and their families during retraining, and the subsidizing of relocation expenses for those workers prepared to take available employment in new areas; public reinsurance for private pension plans, federal unemployment compensation standards to provide a minimum level of benefits across the nation and unlimited extension of duration for workers who have exhausted their state benefits and who are willing and able to accept retraining and suitable work.

Such measures are reasonable and moderate; they would help to shore up purchasing power and facilitate the now painful transitions that workers must make when unemployment strikes. The experience of recent years suggests, however, that even these moderate measures will not be adopted unless there is a will on the part of government—which is to say, on the part of the

American people—to reach beyond technology proper, even beyond economics as such, to the domain of national purpose, values, and direction, and at that higher—or deeper—level, renew our commitment to the national goals implicit in the Employment Act of 1946.

SOLVING THE CENTRAL DILEMMA

If we are to reach those goals, there must be general understanding that our central dilemma is not technical. It is not technology but social intelligence which is failing us. Of course, we do not know enough about the impact of automation. Yet, instead of advancing this argument as a defense of things as they are, we should be establishing, in the executive branch of the federal government, a planning agency which would be equipped to assemble the data on automation and to make informed estimates of the level of private and public spending and investment essential for the full utilization of our resources, full employment of our growing labor force, and the satisfaction of pressing needs in such deficit areas as education, health, housing, urban development, and foreign assistance.

In a framework of public purpose and the full utilization of our resources toward such larger ends, the new technology would be supplying strength and increased efficiency, rather than contributing to unemployment and hardship.

If we are to attain this sense of common purpose, we are going to have to broaden our concept of defense. Our sense of democracy's dangers and opportunities must be broadened to include all the areas in which we must decide and act, not only as individuals but as citizens confidently using the instrumentalities of representative government to defend and advance democratic values.

In a democracy, the initiative for such an affirmation of public purposes and mechanisms must come from the citizen. The citizen must understand that federal investment in the education of our children is as vital to the survival and growth of a free society as the investments that are made in the military establishment. He must understand that the new technology, largely developed at taxpayer expense during periods of national emergency, is affected with a public interest and that we cannot afford to look upon it as merely a private device for the maximizing of profits in disregard of its general effect on employment and production.

ADMINISTERED PRICING

In the sphere of economic activity, the citizen must, perhaps above all, be prepared to insist on a revision of the ground rules which apply to those corporations powerful enough to dominate whole industries—and which are today very different from the rules by which the ordinary competitive business enterprise functions. The administered pricing power of such corporations largely exempts them from the forces of supply and demand which have traditionally acted as governors in the economic machine. Their powers must come under new forms of democratic influence if the fruits of automation are to be equitably shared and not diverted into excessive profits, with the result that mass purchasing power is curtailed. In order to keep such economic power within reasonable bounds, the UAW has suggested a form of public inquiry in instances of proposed price increases in administered price sectors of the economy. Such an inquiry by a federal agency would not involve controls; it would serve, rather, as a means of informing public opinion on the facts of corporate pricing policies and thus encourage a more responsible use of the large corporation's vast price-setting powers.

The citizen must be prepared to insist that the vast public consequences of private decisions made with respect to plant location call for new ground rules here as well. We shall never overcome the problem of depressed areas and their chronic unemployment unless the federal government, through appropriate penalties and inducements, is able to discourage the movement of industry into areas of labor shortage and encourage its location in areas of higher than average unemployment.

The paradox of this phase of the democratic experiment is that only through a resourceful and compassionate use of the instrumentalities of government can individual rights and democratic values be preserved. Only through a wise combination of private and public initiative—which will inevitably entail certain democratic curbs on the hitherto irresponsible exercise of private economic power—can we make the new technology serve rather than frustrate democratic purposes.

The Role of Government

By Arthur J. Goldberg

Abstract: Automation and increased productivity must be encouraged in the United States to the fullest extent if its economic growth and position in the world is to be maintained. Evidence is mounting, however, that the private sector of the economy, particularly management, labor, and education, cannot successfully cope with all the complex problems that technological change and automation have been causing. It is vital to minimize the effects of this growing technology on the individual and upon the established means of production. For the individual, the effect has tended to be unemployment, caused by lack of skills and training. For the physical means of production, the effect has tended to be decreasing industrial productivity, caused by obsolete and obsolescent technology and administrative concepts. High employment and full production and purchasing power cannot be achieved in the United States today without special and co-ordinating assistance on a national scale. Only government can provide the final impetus and over-all impact necessary to accomplish this. Initial steps have been taken.

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TECHNOLOGICAL change and automation are finally forcing the United States to plan its manpower future on a nationwide basis.

The preceding articles in this symposium have already demonstrated the need for national responsibility.

It is perfectly obvious and apparent that the solutions to some of our more intractable problems of industrial obsolescence, employment and unemployment, and educational criteria caused by radical and rapid change in our industrial and occupational structure cannot be solved by private management and labor, whether they work in concert or alone.

Management and labor have done much to work out solutions. But successful efforts to deal with these problems require much more than adjustments that can be made at the place of work.

There is little doubt today that the federal government, with the co-operation of state and local governments, must assume a vigorous leadership in developing, encouraging, and even financing action programs to solve these problems.

I must state at the outset that adjustments to automation and technological improvements can be truly successful only in a proper national economic and social environment—an environment in which new full-time job opportunities are increasing at a rapid pace. Such opportunities will arise only if this nation achieves maximum levels of employment, production, and purchasing power in accord with our national commitments.

AFFIRMATIVE ATTITUDE NEEDED

Implicit in achieving this goal is the extra role that government must play—promotion of an affirmative attitude in all sectors of the economy toward automation. As a people, we have benefited greatly from technological improvements and the rising productivity they have made possible. In the past half century, gross national product per capita has more than doubled. This has taken place with no change in the proportion of the population employed in the labor force and in the face of a shorter work week and more leisure time per worker. It was accomplished, obviously, because of the large increase in our productivity, made possible by technological advancements.

There is no good reason to believe today that this source of our historic economic strength is something to be feared simply because of the occupational imbalance it has created. Americans should not be afraid to face the prospect of change merely because it is occurring so rapidly with such bewildering consequences.

I regard the encouragement and acceptance of automation and technological change by management and labor as one of the greatest roles for the federal government to assume and pursue for the ultimate survival of this nation.

Only by total acceptance, through understanding, can we go on to achieve the goals of high employment and full production and purchasing power. But, this environment cannot be achieved today through our traditional and historic channels of economic development.

Evidence has been mounting to support this view. With each successive recession since industrial technology began its acceleration after World War II, we have witnessed a higher level of unemployment. For eleven months in 1961 we were unable to shake off an unemployment rate of nearly 7 per cent, despite an apparently rebounding economy with record-breaking employment levels each month after the recession struck its bottom last February.

SKILLS ARE LACKING

The one common denominator for the people classified in the hard-core unemployed group has been the lack of skill or experience to earn a living in a new or existing occupation.

We know who these people are. They are our youth, sixteen to twenty-one years of age, with no skills or experience; our older workers, forty-five and over, with obsolete skills or experience; our nonwhite population, who, through discrimination in jobs and training opportunities, have little or no skills or experience; our unskilled and semiskilled operatives, whose limited abilities are increasingly less in demand; and our workers in distressed areas, extremely handicapped by the changing geography of work areas in the United States and with little chance of adapting their training and experience either in their community or where the jobs are.

To this heterogeneous group called the hard-core unemployed today will be added a constant new supply from both our present work force and our potential work force. Job content is changing so rapidly and job longevity is diminishing so sharply that employment for any individual becomes a question of whether he will be able to withstand the forces of change in the techniques of his job or a question of his ability to find a new job easily without long periods of unemployment.

The problem is made acute in this decade by the staggering introduction of 26 million youngsters into the labor force for the first time. More than 7 million of these will have dropped out before high school graduation; a third of these will not have completed the eighth grade. In the light of our increasing educational and skill requirements, this statistic represents a great source of difficulty in the years ahead.

These factors of numbers and quality have become responsibilities that this nation cannot ignore further without dire consequences. They have demonstrated a stubborn unemployment problem, which, in all probability, will become worse if our nation is to grow through technological achievement. They have demonstrated that management and labor working, perforce, in local and private situations cannot cope with the problem as far as the individual is concerned.

TRAINING, A NECESSITY

Thus, it is of the utmost urgency that federal leadership be exercised, first of all, in the training and retraining of workers unemployed or otherwise, so that they can become fully productive citizens in our society.

Large numbers of unemployed workers have had their skills made obsolete and cannot reasonably be expected to secure full-time employment without retraining. Other workers need to have their skills improved and ungraded before they can become fully productive.

If we accept automation and technological improvement in the United States as an absolute necessity, and I believe there is no question that we must, then we have a coequal problem to mitigate technical obsolescence in industry.

Automation and new production techniques must be adopted as quickly as possible in American industry to preserve our productivity lead in the world, which is rapidly industrializing. We face growing economic competition from many countries—the type of competition that our industry has successfully met in the past by the imaginative and efficient use of new technology.

Therefore, another role of the federal government must be to husband and encourage research, development, and uses of new techniques to guarantee the continued growth of our industrial capacity to produce. Too many of our basic and essential industries are attempting to keep pace by using ancient and obsolete machinery, processes, and techniques. Either through lack of technical information, assistance, or funds these industries are failing to meet production goals because of higher costs and antique administrative procedures. Billions of dollars are required to replace the old with the new in industry.

AID TO INDUSTRY

Since a robust industrial community is our national goal, obsolescent plants and techniques must be eliminated in American industry. The federal government has the means to influence the rate of technological change. Tax incentives to private industry to encourage the costly changes is a method. Technical assistance to smaller organizations is another method. Loans to organizations in distressed areas to remain, modernize, and expand is still another method. These things can be done as a realistic action program by the one nationwide entity that can and which has the proper total view and impact, the federal government.[6] It is understood, of course, that state and local governments would share in these responsibilities.

There is a third important role for the federal, state, and local governments, that of instilling new vigor, new concepts, and new curricula in our educational systems.

Actually, not one of our aspirations for national economic growth and ultimate strength can be achieved without a broad-gauge program of learning. Excellence must be our hallmark, both for the student and the courses he studies. The present administration's proposal for federal aid to education is based upon two goals as outlined in the President's message: "A new standard of excellence in education—and the availability of such excellence to all who are willing and able to pursue it."

AID TO EDUCATION

It is imperative to our future that the colleges and universities in the United States have the physical facilities to absorb and imbue with higher learning "all who are willing and able to pursue it."

Education can no longer be a "private" concern, either for our people or for our institutions of learning. Population pressures, intellectual challenges in the scientific contest with communism, and the problems of maintaining highly qualified teaching staffs and teaching facilities are making our historic high level of educational effort inadequate to the future.

Government concern must just as much be directed to our elementary and secondary school levels for the proper preparation of the majority of the nation's future work force. The greatest barrier today in training or retraining our hard-core unemployed is their lack of a basic education. We are confronted with too many people who cannot read well, understand simple arithmetic, or grasp fundamental ideas.

We must halt the flow of poorly prepared people into the labor force at the source, the schools.

The federal government already has a financial role in the vocational education programs, which reach many people in every one of our states. In 1961, for example, a total of more than 4 million persons were enrolled in vocational classes of all kinds.

There are also the thousands of workers who receive training through the privately operated apprenticeship and on-the-job training programs which the federal government has promoted over the years.

But much more needs to be done, and

the government should encourage and help all of these agencies, private and public, to do much more.

ROLE OF LABOR DEPARTMENT

I have discussed the general role of government relative to the impact of automation on the economy. There are many specific pathways the Department of Labor can pave with concrete programs of action.

These programs of action are based on reliable facts and information. They involve a constant examination of employment and unemployment trends by industry, occupation, and area.

Automation and technological development are so widespread and so complex that increasing lead time is needed in foreseeing their impact.

While reaping the advantages of automation, we must minimize and mitigate its adverse effects in temporary displacement of workers or more long-term unemployment. The Department of Labor recognizes its responsibility for leadership in this field and has undertaken a fourfold program of action.

First, we are finding the facts about automation and its effects on workers and about how some companies have, through careful planning, eased the change-over for their employees. We are also seeking to develop an early warning system, under which employers will report impending technological changes well in advance and thus enable this Department and state and local agencies to provide any assistance needed to ease the transition.

Second, we are communicating our findings on the employment effects of automation—through publications, demonstration projects in local areas, and community forums and clinics on suggested approaches to meeting the automation problem. We are encouraging employers and unions to work together in planning for retraining, reassignment of workers, and other adjustments.

Third, we have a number of programs aimed at helping young people prepare for the changing occupational world which is being created by automation and by many other scientific, political, and economic developments. We are, for example, expanding the counseling and testing activities of the state employment services affiliated with the United States Employment Service, strengthening our programs of occupational outlook and job information for use in career guidance, and intensifying our training promotional activities, especially in the field of apprentice training.

Fourth, we are giving immediate assistance in a variety of ways to workers affected by automation. The Department of Labor has pushed for and financially supported an expansion in the counseling and placement activities of state employment services. We are also providing for retraining of some unemployed workers in distressed areas under the new Area Redevelopment Act.

The Department has thus already made progress along each of the four approaches toward a solution of the problems created by technological change. We hope to move much farther along all of these pathways.

SUMMARY AND ACCOMPLISHMENTS

The basic philosophy of the government of the United States in the field of automation and technological change can be stated as follows: Automation and increasing productivity are to be encouraged; they are basic to our aspirations for our own economic growth; they are vital to our position in the international field. By the same token, all steps to minimize the impact of automation on people must be taken, especially through programs of education, training, and retraining and by forward-looking co-operative action on the part of labor and management.

Within this framework, the first half year or so of the Kennedy Administration has seen a wide variety of important steps taken by the executive establishment, the Congress, and leaders in the labor-management field. Concrete action in the industrial relations arena to implement policy and programs has also taken place.

In April 1961, I established the Office of Automation and Manpower, charged with the responsibilities for developing programs to:

(a) Provide an early warning system of impending changes in automatic technology and their impact on employment and jobs.

(b) Communicate this information to labor, management, government, and educational and training institutions so that they may take necessary action.

(c) Mitigate the impact of changing technology on the labor force, especially through programs of training and retraining of unemployed workers, effective guidance and placement work of our employment services, and so on.

(d) Prevent the impact of these changes as far as possible through training of employed workers threatened with the obsolescence of their skills, guidance and career counseling of young persons in the light of changing technology, and related activities.

The Congress approved the establishment of this Office and provided it with funds for the current fiscal year. The Office will also administer the training and retraining provisions of the Area Redevelopment Act of 1961, which provides for assistance to jobless workers in areas of substantial and persistent unemployment for training which will aid their reemployment.

The Office is advised and helped in the formulation of programs by an Advisory Committee on Automation and Manpower, composed of twenty-four leading representatives from labor, management, government, and industrial relations.

In May 1961, the President's Advisory Committee on Labor-Management Policy, including top executives of industry and labor, unanimously agreed on a statement of over-all policy and program in the field of automation which underscored the philosophy and action just described.

Included in this statement were the following points:

> Technological change and automation must be recognized as essential to increasing the efficiency and growth rate of the economy.
>
> The problem posed by automation is how to achieve full technological efficiency without significant and lasting unemployment.
>
> Education and training must be designed to supply newcomers to the work force with the new skill requirements which are going to be needed.
>
> Procedures must be established, probably through Government offices, for the better determination, in advance, of what skills are going to be needed, where, and in what quantities. There must be better measures of the impact of technological change.
>
> There must be broad, new retraining programs developed. This will be a demand on both government and private facilities. These programs must be based on an adequate knowledge of what the retraining is to be for, and that there will be use for the newly learned skills.
>
> The national employment policy must recognize the fact that workers will move in the future more than in the recent past, from one plant to another, from one industry to another, from one skill to another, even from one area to another. There is need for serious study, in the development of both government and private collective bargaining policy, of ways to permit such movement with due recognition for the economic costs of moving and of retraining, the value of employee rights

which have accumulated with service (e.g., pension and seniority), and the human factors involved.

The year 1961 witnessed a number of significant actions in the field of industrial relations relating to automation and technological change. In industries ranging from steel to telephones to meat-packing to music, contractual provisions are being carried out and added which have as their overriding aim the amelioration, mitigation, and even prevention of the impact of automation and technological changes on workers. The provisions range the spectrum from "technological unemployment pay" to on-the-job training of workers to fit them with skills needed for new technology to funds for the retraining of displaced workers.

Automation Outside the United States

By David A. Morse

ABSTRACT: Today, automated equipment can be found in all parts of the world. In the industrial countries, automation has gone beyond the experimental stage and has turned into a rapidly growing movement. In the developing countries, individual examples of automation exist, but they are still rare and isolated. Technically, automation is everywhere alike. But the reasons for its utilization, and its social and economic impact, vary between countries according to their stage of development, international trade factors, employment situation, skill level of the labor force, and other factors. So far, there has been little evidence that automation causes unemployment, particularly in Europe where labor shortages are on the increase, although a certain amount of dislocation is inevitable in the transitional stages. A variety of social measures, combined with early consultation of the workers affected, should help effect a reasonably smooth transition until the benefits of higher productivity may be reflected in the economy in the form of more job opportunities. The International Labour Organisation has devoted much attention to the social impact of automation and expects this field to remain at the forefront of its preoccupations for many years to come.

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IT is a truism in the United States today that automation has immediate and far-reaching consequences for the social and economic life of the country. Agreement might be less general if the same were to be said in relation to other countries. Have the principles of automation burst through national boundaries and been applied under different social and economic conditions? Will automation level out or increase the difference in these conditions between countries? These and other questions merit close attention. Their answers hold the key to the future of a world which has raised national income, productivity, and living standards as its banners of progress.

The International Labour Organisation (ILO), by virtue of its constitution, deals with matters of labor-management relations and social adjustment. The International Labour Office—the permanent Secretariat of the Organisation—collects, analyzes, and publishes information on these problems from all parts of the world. In keeping with its international responsibilities, the ILO pays constant attention to the social consequences of technological progress in all countries, regardless of their stage of economic development or system of economic organization. It attempts, through the various means at its disposal—universal, regional, and industrial conferences, research, technical assistance, publications—to pave the way for a smooth transition from one form of production to another or for the introduction of economic activities which hitherto had not been in existence. These responsibilities have brought the ILO into contact with automation at an early stage.

SOME ILLUSTRATIONS

Lest there remain any doubt in the reader's mind, let me state at the outset that automation is a widespread phenomenon which can be found in all parts of the world without regard to linguistic, cultural, trade, or political barriers. Paradoxically, it is often the most advanced technology which ignores such confines most successfully, while earlier and technically less complex processes frequently remain imprisoned within conventional restrictions.

While the United States clearly had a head start with automation in the 1940's and undoubtedly still leads in a great number of applications, the fifties witnessed the swift spread and development of similar techniques in all industrialized countries and in a number of developing countries. This universal thrust toward automation is proof in itself that the new technology constitutes a major turn in the world's economic history.

It is, of course, impossible within this context to present anything like an assessment of the extent of automation in the world, let alone to make a comparative survey. Broadly speaking, automation has gone beyond the experimental stage in most industrialized countries and has become a rapidly growing movement, but it has not yet made a significant impact on the economy as a whole. In the developing countries, the situation at the moment is one of isolated applications.

The few examples below of automated installations in selected countries are picked at random and merely serve to show that the technical nature of automation is the same everywhere; the differences lie in the nontechnical fields.

United Kingdom

In the United Kingdom, for instance, a large drugstore chain (excluding catering) introduced office automation in 1960. An all-transistor computer replaced the paper work in the ordering of goods from branches. The basic document is held by the branches and consists of a general stock sheet combined with an order card which, when transmitted to the head office, is automatically translated into a punched card. The latter governs the whole order and invoice procedure. As a result of reading the punched card and according to the program of instructions laid down, the computer stores and amends records, prints invoices, records outstanding orders, charges branch accounts, prints buyers' reports of statistics, and carries out a whole series of other operations which previously had occupied a large office work force.

France

The re-equipment program for the French National Railways has resulted in the introduction of a variety of automated devices which have saved expense and have made service both faster and safer. Centralized traffic control has made it possible to retain two-track operation on a mountainous section of a particularly heavily traveled line (Paris-Dijon) where the installation of additional tracks would have involved heavy expenditure on tunneling and bridge rebuilding. On another heavily traveled stretch (Dôle-Vallorbe), two-way traffic control over a single track has been handed over to an electronic computer. Automation is also used in marshaling yards where television, tape recordings, telecommunications, and remote braking have improved efficiency to a great extent. New marshaling yards have enabled the railway administration to close down a number of smaller yards and to curtail operations in several others, thereby effecting large savings.

Sweden

An interesting example of automation in the baking industry can be found in Sweden. The Swedish *knäckebröd* (hard, flat rye bread) lends itself admirably to mass-production techniques. One factory produces 120 tons of bread a day, using 150 tons of flour, 3 tons of yeast, a ton of salt, and over 5,000 gallons of milk. All handling of the grain—including reception, cleaning, aeration, transport between silos and the mill, classification and mixing—is handled by one man from a central operating desk. After baking, any defective bread is directed to the waste pile by pressure of a button. Such faults could be detected by photoelectric cell, but the human eye was considered a more reliable judge.

Eastern Europe

As regards the countries of Eastern Europe, and in particular the Soviet Union, there can be no doubt that progress in automation is one of their first economic objectives. Premier N. S. Khrushchev himself has stated:

> [W]ider automation of production must be envisaged in order to radically alleviate and improve conditions of work and increase productivity. . . . Automation changes the character of work fundamentally, raises the cultural and technical level of workers, and creates the conditions necessary to eradicate the difference between intellectual and manual work.

The draft program of the Communist party of the Soviet Union published in the summer of 1961 states that automation and comprehensive mechanization will be used "to reduce the length of the working day, to improve living conditions, eliminate hard physical work and, subsequently, all unskilled labour."

Soviet Union

As the Soviet Union is known for its production of heavy capital equipment, I have selected an example of automation which may be unfamiliar to the Western reader—watches. In the first half of 1961, the Soviet Union produced over 13 million watch and clock movements and became the second largest watch producer in the world. This development must be viewed against the fact that the country had no watchmaking tradition—a most important element in this industry—and started its horological industry on a small scale in 1930. The first major automation development was the construction in 1955 of an automatic line for the machining of watch cases, which increased productivity by nine times. Several automatic lines for the production of parts have been completed since then, and certain assembly, inspection, and finishing operations have also been made automatic. Until recently, the adjustment of the escapement—which determines the accuracy of the watch—was made by a highly skilled worker using his sense of "feeling." A new assembly line uses an optical projector which produces an enlarged image of the parts to be adjusted. The time required for adjustment was thereby cut in half, and workers of a lower skill grade can perform the operation. The adjustment of hairspring length and the oiling of bearings are also done automatically.

Other examples

No list of automation examples could be considered as indicative without mention of the large automobile plants, the steel, chemical, glass, and electronics industries, oil refineries, power plants, banks, post offices, and so on. Many modern installations can be found in countries where, until recently, industrial development had not been significant: steel in Brazil, India, and Venezuela; cement in Ceylon; power and chemicals in one or two new African states; oil refineries in Morocco, Philippines, and Guatemala.

What, then, are the factors promoting the introduction and spread of automation in such diverse environments? Reductions in labor costs alone could not account for it, for automated installations have been introduced in areas where wage levels are still very low. A part of the answer can be found in the numerous other advantages of automation. Automated plants generally produce goods of higher uniformity, narrower specifications, and better quality than is possible with conventional methods. As a result, there are fewer rejects, with consequent savings of raw materials. Next, there are a number of processes which cannot be carried out by other than automatic methods and others only at the risk of the workers' health. Finally, because of the increased utilization rate of machinery in automatic plants or for other reasons, automation may save capital as well as labor. Taking into account the compact nature of installations and consequent lower cost of premises as well as the smaller investment required for social facilities, the cost of installation of an automatic plant may, in some instances, compare favorably with that of a conventional one.

Limitations

So much for the factors in favor of automation. What about the limitations? Apart from the social implications, about which I shall have more to say further on, there is the question of market size. Obviously, the larger the market, the greater the incentive to invest in higher productivity. The European Economic Community and the European Free Trade Area are outstanding current examples of the adaptation of commercial policy to the dictates of modern technology. In a similar manner, the Soviet Union and the countries of Eastern Europe are in the process of shaping a vast, interconnected trading network on the basis of specialization and mass production. In other cases, foreign trade has to furnish the basis for automation, as in Japan, the oil and mineral producing countries of Asia, Africa, and South America, and elsewhere. In the underdeveloped countries, domestic capital formation and foreign currency reserves are likely to be a severe limiting factor in the creation of automated industries.

IMPACT ON EMPLOYMENT

Fear of unemployment accounts for a large part of the negative connotations of automation. Does automation, in fact, engender unemployment, or will it conform with the precedent of technological progress in general, which has ultimately added to employment opportunities?

To a large extent, the consequences on employment depend on the speed with which automation is introduced. Any change in production methods, and particularly a sharp increase in labor productivity, invariably requires readjustments in the labor force. Given enough time, these can be taken in stride through the play of normal labor mobility and, if necessary, by the use of some additional social measures, such as provisions for voluntary early retirement, dismissal allowances, assistance for retraining, increased coverage, duration and amount of unemployment compensation, and similar provisions. The view is gaining wider acceptance, particularly in industrialized countries where unemployment affects mainly special regions or sectors of the economy, that it is not only socially desirable but also economically sound to allocate considerable resources to the organization of the employment market. Consultation, at the earliest possible moment, with the workers likely to be affected is also being recognized as a factor of paramount importance.

Short-term displacement

Generally speaking, it is only the short-term problem of labor displacement that needs to be taken into account since, in the ultimate, increased labor productivity is bound to benefit the community by giving rise to economic growth and social benefits. Its fruits can be shared in any one, or in a combination, of the following ways: higher wages, lower prices, more leisure, greater investment—all of which are, in principle, employment creating. In certain instances, however, the short-term effects may be of such magnitude that the stimulating effect of technological progress by itself may be insufficient to promote an adequate rate of growth to provide full employment for a growing labor force. In such cases, there is a danger that opposition to automation may become strongest in declining industries, that is, precisely those industries whose continued viability may depend on the introduction of more modern methods.

Of equal importance to employment is the vitality of the economy. In a stagnant or slowly growing economic environment, dislocations resulting from the introduction of automation may be difficult to deal with. In a rapidly growing economy, while dislocations are still bound to take place, they can be accommodated more easily.

Solution to labor shortage

In Western Europe, the economies have gone through a period of rapid and sustained growth and there is little reason to apprehend a change for the worse. As a result, manpower requirements in many countries have been increasing at a much faster rate than the labor force, and labor shortages of a quite serious nature have become more and more frequent. Only the contribution of countries with pockets of continued unemployment or with lower living standards has helped fill the gap, and even this influx of workers is beginning to give signs of drying up. Far from causing unemployment, automation is, therefore, a welcome instrument to help meet the demands of the Western European markets. At the same time, progress in automation is usually most rapid in those sectors of the economy which are themselves expanding at a fast rate. Dislocations have been kept within reasonable limits, and dismissals have been the exception.

New fields

In Eastern Europe and the Soviet Union, the authorities emphasize that, far from reducing job opportunities, technological progress constantly opens up new fields of employment. Here, as in all other cases, automation has brought about dislocations and problems of adjustment. These are being tackled by means of new training programs, about which I shall have more to say below.

What about the employment creating side of automation? Without doubt the satisfaction of the demand for automatic machinery will open up new jobs in many of the industrialized countries. This aspect is of special significance to a country like Japan where automation is in the process of abolishing a large number of semiskilled jobs but where there exist considerable possibilities for the design and manufacture of automated equipment for export. In other instances, this has worked against the interest of certain countries which, by purchasing automatic equipment abroad, have "exported" employment. Would higher wages, increased leisure, and lower costs help to maintain or raise the employment content of the economies? Surely the lower prices, or better quality, of goods and services provided with the aid of automatic equipment have been an important factor in increasing the demand for them; in some cases, this increased demand has greatly exceeded the rise in labor productivity so that, after the introduction of automation, more jobs were available than before. Usually, however, this has not been the case, and industries have tended to cut down their work forces after the introduction of automation. On the other hand, where higher wages and increased leisure are made possible by increased productivity, they do provide a compensating element in the equation. Higher wages—or conversely the periodic price slashing in the centralized economies—provide people with more to spend on other things and so create new job opportunities. Shorter hours of work, in addition to spreading the aggregate employment potential, may create new wants, mainly in the service fields—entertainment and culture—where automation is unlikely to have much impact.

Less developed countries

In the less developed countries, particularly where there is a surplus of labor, preference may have to be given to production techniques which are labor intensive. However, even in such countries, the introduction and spread of automation cannot be entirely ruled out. One of their main economic problems is shortage of capital. There may, therefore, be a case for introducing capital-saving automation, even though it provides, directly, rather few jobs, although, through a linkage effect, it may create new employment opportunities in related industries which either supply raw materials to automated plants or process their products. Secondly, there are industries in which automation is a technical necessity. Next, there are industries where there exists some scope for choice between automated techniques and conventional ones but where, from an economic point of view, it may be desirable to go in for automation because the final product is of basic importance to the economy as a whole and automation ensures a rapidly expanding output at a reduced cost. Finally, there are those industries which require skilled workers that are in short supply; it might, thus, be preferable to resort to automated techniques in order to reduce the need for such workers, but it would be erroneous to be guided merely by a desire to avoid problems of labor-management relations.

CHANGES IN QUALIFICATIONS

The manufacturing system symbolized by the assembly line was the heyday of the semiskilled worker engaged in repetitive and relatively simple manual operations. In the automated factory, many of these functions are taken over by machines. The number of operators for a given volume of production is therefore smaller, and their skill requirements are of a different order: physical strength and manual skill recede in importance; perception, co-ordination, and sense of responsibility become prominent.

While this change in the work content of machine operators holds some hope for greater work satisfaction and a rise in status, it also contains the risk that certain jobs may consist of tedious tasks requiring unremitting attention, thereby reducing the worker to a dial watcher. Indeed, one of the main complaints of operators transferred from conventional machines to automated ones concerns the "perceptual load" imposed on them, that is, the mental stress of performing highly responsible tasks through reliance on the senses. It may be hoped that new machines will assume a wider range of low-level "thinking" and that, with improved design of control devices, perceptual load may be substantially reduced. It is unlikely, however, that certain social satisfactions of classical production methods (personal contact, teamwork) will be present in automated plants to the same extent. Cultural differences must inevitably play a large role in this connection.

In automated office processes it has been observed that a number of routine operations have been abolished but that the lower office supervisors have lost their previously important role of supplying decisions on a number of minor questions which arise in the manual handling of office work.

In an automatic plant, maintenance personnel are proportionally much more important than in a conventional one; in some instances, their number is greater than that of machine operators. Their training has to take account of the great complexity of the equipment, which usually functions through a combination of various techniques—mechanical, electrical, electronic, pneumatic, and so on. Such a combination of skills is difficult to find and makes heavy demands on the training facilities of many countries. Needless to stress, the demand for technicians and scientists has also been increased by automation.

Educational reform

The preoccupation with automation and its probable effects on the structure of employment has undoubtedly been a factor in the expansion of general and technical education. Various arguments in favor of increased mechanization and automation have played an important role in determining the general lines of educational reform in the Soviet Union and other Eastern European countries. Generally speaking, however, most European countries were ripe, at the end of the last war, for a lengthening of general compulsory education and a change-over from the traditional classical education, accessible only to a small proportion of the younger generation, toward modern lines emphasizing modern languages, mathematics, and science, open to a wider section of the population. Economic prosperity and a high demand for qualified manpower have helped these trends to break through.

In many of the older industrialized countries, there still subsists a tradition of craftsmanship of distant origins which lives a life of uneasy coexistence with modern industry and trade unionism. Apprenticeship courses and "skilled" employment status are, to some extent, determined by this ancient concept, and collective bargaining is influenced by it as well. The present trend—in East and West alike— is toward a revision and consolidation of the list of officially recognized occupations and of examination requirements. New occupations directly related to electronics repair and maintenance work have been introduced. Training courses for supervisors and for skilled workers aspiring to become technicians and foremen have multiplied rapidly.

In a number of European countries, there exist efficient systems for adult retraining which have generally operated below capacity because of the favorable employment situation. In cases of redundancy, these facilities become extremely important, for they help provide a smooth transition by reducing structural unemployment periods to a minimum.

WAGES AND HOURS OF WORK

Not so long ago, the individual incentive wage—that is, a wage tied in some way to the worker's personal output—was regarded as unassailable as the very concept of productivity it was supposed to promote. The increasing dependence of the worker on the performance of machines and on plant organization for his personal output has led to a growing use of the straight-time wage.

In an automated production system, the personal contribution of the worker to output stands in a new relationship which, so far, has not been deeply explored. Without doubt, various solutions will be tried out before new wage policies are adapted to everyone's satisfaction. In the meantime, the trend away from individual incentives and toward group incentives or straight-time payment appears to be general.

The grading of new jobs has also been a matter of serious concern to trade unions in many countries. Increasing use has been made of job evaluation as a means of determining the relative status of newly created jobs within the framework of existing wage scales.

Together with claims for higher wages, a reduction in hours of work has been one of the chief aspirations of trade unions in recent years; the ILO has been the international forum in which this claim has been most frequently voiced. In fact, most industrialized countries where normal hours of work are still above forty a week have recently witnessed reductions, bringing a number of industries close to, and even below, the forty-hour standard. Despite various strong counterarguments, and despite the offsetting effect of longer hours of overtime resulting from a short work week in a tight employment market, there is sufficient evidence to predict that actual hours of work will continue to become less, and, conversely, leisure will become more important in a number of countries.

The effect of automation on hours of work can be summarized under the four headings: productivity, job displacement, fatigue, and shift work. As regards the first, it is the policy of trade unions to claim that increases in productivity should be shared with workers not only through an increase in wages but also through shorter hours of work. The fact that a certain amount of job displacement appears inevitable when automated equipment replaces classical production methods strengthens the argument in so far as the available employment potential can be spread. Workers have complained that the mental effort of giving constant attention to complex equipment justifies shorter hours. On the other hand, automation makes possible, and indeed often necessary, continuous working by means of shifts; this necessitates further study of the effects of shift work on the health, social life, and psychological attitudes of workers and close attention to the best way of arranging work schedules.

Traditionally, the virtues of long hours of hard work have received more attention than the joys of well-spent leisure. The profitable use of leisure has been under discussion ever since workers have been in a position to enjoy substantial free time. Nevertheless, if there is to be a transition from a work-obsessed civilization to an age of more leisure, this will require a profound change of outlook and may have to be accompanied by a renovation of educational, recreational, and cultural facilities.

THE ILO AND AUTOMATION

The social consequences of technological progress—of which automation is but an accelerated form—have been the subject of numerous provisions adopted under the auspices of the ILO even before the Second World War. More recently, attention has been focused on the problems of automation as such. In 1956 the International Labour Conference dealt with them at some length and adopted a resolution which specified, among other things, that close and continuous consultation should be established between the parties concerned in planning and in taking action to meet any labor and social problems and that public policies and services should be adapted to the changing needs of the employment situation; it also stated that particular attention should be given to the problems of the less developed countries. In 1957 I submitted a report dealing mainly with the social consequences of automation to the International Labour Conference.

The Industrial Committees and similar bodies of the ILO[1] have examined the social repercussions of automation on particular industrial sectors. The first to do so was the Metal Trades Committee in 1957. In 1959 the Advisory Committee on Salaried Employees and Professional Workers examined the effects of mechanization and automation in offices. In 1961 the Inland Transport Committee dealt with the social consequences of changing methods and techniques in railway and road transport. The Metal Trades Committee, at its 1963 session, will examine the acceleration of technological progress and its influence on the effective utilization of manpower and the improvement of workers' incomes. In each instance, a report has been prepared by the Office on the subject in order to assist delegates to arrive at conclusions which are transmitted to all ILO member states and, through them, to the employers' and workers' organizations concerned. It is almost certain that future meetings of Industrial Committees or meetings of a similar type will have on their agendas an item related to automation and its social consequences.

The list of ILO activities related to the social consequences of automation could be lengthened considerably, because a large part of its work is necessarily concerned with technological progress in its various forms and under different circumstances.

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[1] Each committee—as is the case in the International Labour Conference and in ILO regional conferences—is composed of government, employer, and worker delegates for each country represented.

CONCLUSION

Let me conclude this rapid excursion into an exceedingly complex and vast field by saying that technological change today affects each region and each nation at an ever faster pace. The desirability of this evolution need not be discussed, for there is no question of turning back and little possibility even of regulating the speed of development. Our aim should be to ensure that technological progress is translated into social progress. If we do not move forward fast enough in the social field, our whole civilization may break under the strain of change; if we do, we open the way for creating a higher and richer civilization than man has yet known.

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INTERNATIONAL RELATIONS

JOHN W. SPANIER. *American Foreign Policy Since World War II.* Pp. viii, 234. New York: Frederick A. Praeger, 1960. $4.50.

As a useful catalogue of events over the past fifteen years of United States foreign relations, this book provides a cogent and helpful review. Particularly enlightening is the author's recapitulation of United States Far Eastern policies, their background, and the interplay of events and public reactions to them. Dr. Spanier's discussion of the Truman-MacArthur controversy is especially interesting and authoritative. He has recently written an excellent book on the subject.

When the author moves away from review of Far Eastern relations, one finds assertions which raise questions never quite answered. Thus, it is a welcome notion that pro-Westernism will accompany development in less developed areas, especially so in light of pre-Castro Cuba's having reached the highest industrial development in Latin America. One seeks—in vain—the bases for the author's sanguineness. The idea that the United States and her allies "actually hold a superiority of manpower over the Soviet Union and its satellites" is equally appealing, but, with the likelihood of increasingly widespread phenomena of the De Gaulle type and the absence of Western unity on matters far less consequential than war, one again seeks justification for the assertion. If it is true that "in terms of conventional warfare, the West retains a comparative advantage," one should know the reason for the happy tidings. Indeed, the Pentagon should.

Chapter One, "The Liberal Approach," represents the author's attempt to provide an analytical framework for the book. It falls short, resorting to a kind of intellectual scapegoating which this reviewer finds particularly annoying. It is the author's suggestion that *Realpolitik* is not possible to the American Liberal, that United States Liberalism fears the realities of power and acts without consideration of national security when it has control over the instruments of power. In failing to provide the reader with any semblance of an operational definition of this "Liberalism," the author brandishes the book's chief weakness and devoids the allegations of real meaning upon which to argue.

To one who believes that Liberalism is an approach to policy which works to maximize personal liberty amid equally important considerations of national security, it is not troublesome to read that there is a tendency in Liberalism which "restricts the power of the state," but, when the term is undefined, the concept must surprise those wont to condemn the New Deal and other Democratic eras as manifesting Liberalism's tendency to magnify federal power. It becomes more mischievous, however, to assert that Liberalism shows a "disregard for national security [that] is reinforced by dislike for 'power politics' and the use of violence." With Franklin D. Roosevelt urging and even promoting intervention well before the destroyers-for-bases deal; with Truman selling and then implementing the Marshall Plan, Greek-Turkish aid, the North Atlantic Treaty Organization, and the Berlin Airlift; with Eisenhower engaging in military "pact-itis" and landing marines in Lebanon; and with Kennedy embarking on the greatest peacetime remilitarization in United States history, one wonders in whose persons all this disregard for national security lies. If, as the author states, the Liberal regards power politics as a "dirty game," either the recent protagonists of United States foreign policy delight in dirty games—a not unreasonable assertion, had it been asserted—or the author referred to people not involved in formulating the United States foreign policies he describes. Who, then, are these mischievous Liberals?

Notwithstanding the failure to provide definitional means to answer this question, the very able Professor Spanier, once he launches into history, gives us a most helpful summary of events in the last fifteen years.

JAY H. CERF

Deputy Assistant Secretary of
Commerce for International Affairs
Former Director of the Foreign
Policy Clearing House

SHELDON APPLETON. *The Eternal Triangle?: Communist China, the United States and the United Nations.* Pp. xiv, 274. East Lansing: Michigan State University Press, 1961. $5.95.

One of the most unfortunate blows to America's international welfare has been the corruption of the question of Chinese representation in the United Nations into an issue of internal partisan politics. It has prevented a discussion of the problem on its merits alone and has affected disadvantageously America's over-all policy in Asia.

Mr. Appleton's coolheaded and sharply analytical book is a great relief from the more usual argumentative and polemic approach to this subject. There are few new facts in this book. It summarizes developments during the last twelve years which are essential to an understanding of the situation today, especially as it affects American interests: the rise of the Communists and the decline of the Nationalists; the legal and procedural complications resulting from this in the United Nations; the international political significance of the representation question and its reflection in the politics of the General Assembly; and haphazard American policy and the public's attitude toward it.

The important contribution of the book —apart from some interesting experiments with predicting voting behavior—lies in the sound evaluation and balancing of the many arguments for and against a change in China's representation. With the help of history, public opinion studies, personal interviews of key officials, and well-substantiated speculation, reasoned conclusions are reached pointing to a fairly clear and almost inevitable path for American policy —if it is to be rational and logical. If a political defeat in the United Nations, or worse, is to be avoided, the prime requirement, as it emerges from the book, is tactical flexibility. That this could involve some relaxation of China's "containment" is a concession not to Peking or to communism, but to America's self-interest, friends, and allies. The consequences would not be tragic. The seating of Communist China would not be "an unmixed blessing for the Communist world, nor an unmitigated disaster for the United States." The danger that the United States would withdraw from the United Nations in such an eventuality is small because the group demanding it is rather insignificant, and the public would accept the situation as it has others it did not expect to like. The one premise the author accepts, with most other discussants of the topic, without further investigation is that Communist China either is or soon will be a first-class power.

WERNER LEVI

University of Minnesota

G. F. HUDSON, RICHARD LOWENTHAL, and RODERICK MACFARQUHAR. *The Sino-Soviet Dispute*. Pp. ix, 227. New York: Frederick A. Praeger, 1961. $5.00.

No historic controversy in international affairs quite matches the controversy waged between China and the Soviet Union during the past few years. The protagonists are (1) the most populous country in the world and (2) the largest country in the world—dominating, between them, the Asian continent and about one-third of the world's population. Yet, what is the argument about between these firm members of the Marxist-Leninist ideology? One searches in vain for clear and precise explanation of the issues involved, and every pundit's interpretation seems as valid as any other. Yet it seems obvious that the delineation of the controversy, and the effects of its ultimate outcome, have profound meaning for all the peoples of the world.

The present volume is introduced by essays by Messrs. Hudson, Lowenthal and MacFarquhar, but consists principally of the documents through which China and the Soviet Union have expressed their disapproval of certain policies and attitudes of the other, especially in 1959–1960. Actually, the Sino-Soviet controversy has passed through three or four different phases since 1957. One phase had to do with the 1957 Meeting of Communist and Workers' Parties, which produced a Declaration ostensibly resolving differences which had become evident during the period of the Hungarian Uprising and the Suez War. Communist China's ideological crusade against "Yugoslav revisionism" in 1958 could be considered a postscript to the controversy of 1957, in which Peking recorded some doubts as to whether the 1957 Declaration resolved all matters in dispute. In 1959–1960, the Sino-Soviet controversy took a different form, and the present book reproduces the key documents—including newspaper editorials—of a political fight that had temporary culmination in the Statement of the Communist and Workers' Parties issued in Moscow late in 1960. The most recent aspect of the continuing controversy, exemplified by the Chinese "walk-out" from the Twenty-Second Congress of the Soviet Communist Party over the ostensible issue of Albania, follows the period covered in the present documentation, but turns on the same issues presented here.

China and the Soviet Union are nation-states of sorts, each with its own interests, which appear to be at variance. Yet nearly everyone outside of the Sino-Soviet bloc seems entitled to have his own interpretation of these differences, because they are expressed within the special context of a Marxist-Leninist ideology whose fundamental assumptions seem not to be grasped by nonbloc observers. Ideological differences expressed in variant views of such ideological matters as "revisionism" seem remote from the world of actuality. The careful reader of the materials in this book will soon grasp that what is in contention, fundamentally, is a difference over the manner in which the Communist world is to be organized for the pursuit of its common world revolutionary objectives. Soviet emphasis on —empirical—acceptance of the power position of the West is posed in contradiction to Chinese emphasis on—dogmatic—acceptance of Lenin's basic teachings about the war like nature of "imperialism." Soviet leaders accuse the Chinese of "dogmatism"; Chinese leaders accuse the Soviet leaders of being "empiricist" or "revisionist." Such mutual recriminations have dominated the internal history of Communist parties in many countries, over extended periods of time; now, they present themselves as issues in controversy between states under control of Communist parties. The immediate issue—never stated in such terms, but clearly implicit—is whether Communist states are to place reliance on some subtle change in the character of American imperialism. The Chinese say, "No"; the Soviet leaders say, "Maybe, perhaps." With Taiwan still excluded from Chinese Communist control, the Chinese insist that "imperialism" cannot be trusted; it must be defeated. They therefore demand a "veto" over Soviet initiatives directed toward reconciliation with the West!

H. ARTHUR STEINER

Professor of Political Science
University of California
Los Angeles

SETH P. TILLMAN. *Anglo-American Relations at the Paris Peace Conference of 1919.* Pp. xiv, 442. Princeton, N. J.: Princeton University Press, 1961. $8.50.

This book is an excellent and perspicacious study of the first great Anglo-American experiment in co-operative diplomacy on a world scale. The experiment failed so far as the League of Nations was concerned, and some of the other results of the conference were unhappy. But Mr. Tillman points out with justice that the American and British delegates were "responsible for the most enlightened, most progressive and most moral features of the treaties of peace," and that was because "they worked together with reasonable harmony for the achievement of common objects."

In those days I was the Washington correspondent of *The Times* of London and followed the American delegation to Paris, where I often felt that about the only redeeming feature of the conference was, indeed, the cordiality with which the British and Americans usually co-operated, and the good temper which they displayed when impelled to differ. The President and the Prime Minister did not, of course, hit if off. Mr. Lloyd George regarded Mr. Wilson with an odd mixture of jealousy and contempt, and Mr. Wilson distrusted him. But, below them, Mr. A. Y. Balfour, the Foreign Minister, and Colonel House were congenial to each other and firm believers in Anglo-American solidarity; while their subordinates sometimes even found it advisable to conceal the closeness of their accord for fear of offending the others.

As an eye-witness of many of the Anglo-American dealings at the conference, I find myself in admiring agreement with Mr. Tillman's well-documented, comprehensive, and lucid narrative. Only on one important point of opinion do I take issue with him. He believes that President Wilson was right to attend the conference; I hold to the then predominant view that he was wrong. He was no match for the tough and seasoned politicians of the Old World. The League of Nations, his one resounding personal success, was doomed to failure anyway; the nations were not ready for it. It would surely have been better for him to return to Washington after his tour of the allied countries, leaving the American leadership in Paris to Colonel House, who was skilled in diplomacy, liked and respected by his foreign colleagues, and familiar both with their idiosyncracies and with the problems to be dealt with. By thundering, when necessary, from the distant Olympus of the White House, the President might have exerted more influence on the conference than he actually did.

ARTHUR WILLERT

London

LOUIS HENKIN (Ed.). *Arms Control: Issues for the Public.* Pp. ix, 207. Englewood Cliffs, N. J.: Prentice-Hall, 1961. $3.50.

The subtitle of this volume of background papers for the 1961 American Assembly assumes further public discussion. All of the papers are good. Some—notably James E. King, Jr.'s "Arms Control and United States Security"—are outstanding. Mr. King is a defense analyst; William R. Frye, a journalist; Robert R. Bowie and Jerome B. Wiesner, Kennedy teammates; Malcolm Mackintosh and Harry Willetts, British Kremlinologists; Jacques Freymond, a Swiss professor of history and international relations; and the editor, an American law professor. Their excellent volume can be criticized only for indirectly reinforcing public ignorance of three additional problems: (1) the control of biological and chemical "agents," (2) planned subversion, and (3) the responsibilities which a smaller or "nth" power accepts when it subscribes to the United Nations Charter.

Dr. Wiesner mentions the control of Biological and Chemical Warfare (BCW) production in his "Inspection for Disarmament" (p. 116), but does not discuss it further. The whole problem, though the lack of an index makes the volume difficult to use on individual issues, is posed in terms of nuclear agents, missiles, and

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conventional means of delivery. Yet BCW agents are in current production, and because of their cheapness and close ties with peaceful "civilian" research and production are much more likely to be available to the nth powers than prestige nuclear weapons and missiles. The authors realize that disarmament must follow political agreement, but again give no more than intermittent attention to controlling propaganda and other cheap cold-warfare activities. These too are weapons for the nth powers and hard to control by the great powers on whose sides the nth powers are presumably aligned. Though this problem may be beyond the control of the great powers, it is hardly fair to the public not to discuss it. The Assembly's Final Report may show that these three problems were not discussed by that body either. BCW is not specifically mentioned. Though "comprehensive disarmament will require far-reaching changes in the prevailing political climate and patterns of political behavior, including fundamental change in the foreign policies of the Soviet Union and of Communist China," the Report—drawn up two weeks after a Cuban incident in which one of the authors of these papers was supposedly implicated—does not suggest, except possibly by implication, that American cold warriors may not always be contributing to our national goal of "a world in which nations settle their differences by peaceful means" (p. 202, 204). As for Cuba's responsibility, everyone agreed to ignore the nth powers, though some of the participants were surely alive when three young indirect agents of the Serbian government shot the Archduke.

THEODORE ROPP

Duke University

BERNHARD G. BECHHOEFER. *Postwar Negotiations for Arms Control.* Pp. xiv, 641. Washington, D. C.: Brookings Institution, 1961. $8.75.

Propitious circumstances combine to give this volume an authoritative quality. The author, Bernhard G. Bechhoefer, was for twelve years, from 1946 to 1958, a senior officer in the Department of State, dealing with the armament control question. Advising him on this book, in accordance with the usual practice of the Brookings Institution, was an eminent committee which included other men who had been involved in negotiations, for example, Harold Stassen. The main lines of the narrative are taken from the documentary records and from official accounts of negotiations.

Mr. Bechhoefer divides the subject chronologically into five periods and describes the significant developments within each: (1) 1946–1948, devoted to foundation-laying in national policies; (2) 1948–1951, marked by "complete frustration"; (3) 1952–1954, characterized by "comprehensive proposals"; (4) 1955–1957, conspicuous for a search for "partial disarmament"; and (5) 1958–1960, notable for discussions of surprise attack, nuclear testing, and general disarmament. As he proceeds, he gives the substance of Russian and Western proposals, often quoting from them, and he presents the arguments advanced by both sides on the positions taken. Although his prime objective does not appear to be one of passing judgment, he does not hesitate to point out the shortcomings of policies and the processes used for their formulation; he notes, where appropriate, the relation of policy to propaganda and to political conditions. A by-product of the author's account, perhaps unintended, is a convincing portrayal of Russian methods of negotiating and of the frustrations which every diplomat who deals with them inevitably encounters.

To produce a clear and substantial report of what has happened from the complex negotiations of fourteen years on arms control is an ambitious undertaking. Mr. Bechhoefer's effort must be called a success, for his account is both clear and substantial. In the final chapter, the author summarizes the five periods of negotiations which he has earlier described in rather minute detail, thus tying together the chronology of developments in a helpful manner. This reader wishes that there had been a summary of the past arranged topically as well as chronologically. Using the Index, he cannot pin down with ease and precision the irreconcilable differences between the West and the Soviet Union on such subjects as inspection systems, control machinery, and nuclear testing, nor can he find the shifts in position on those projects without a research effort of his own throughout the pages of the book.

NORMAN HILL

Professor of Political Science
University of Nebraska

JAMES DAVID ATKINSON. *The Edge of War.* Pp. xix, 318. Chicago: Henry Regnery Company, 1961. $6.00.

War and peace, Professor Atkinson argues, have become obsolete terms. The Communists, in their design for world domination, mix "violent and non-violent methods of warfare into an over-all strategy of unorthodox warfare against the non-communist world" (p. 51). "Warfare is now a contest between peoples—and their civilizations—whose whole physical and moral forces are mobilized with all their economic, industrial, military and moral resources" (p. xv). The author deals in detail with the means used in this contest; they are mainly propaganda, espionage, subversion, guerrilla warfare, and economic and political warfare—the present reviewer once called this concept and its execution "the war without battlefield." The author then discusses the American experience in unconventional warfare, with particular attention to the successes in Iran and Guatemala, and concludes by showing that America is well placed to win the contest.

The author rightly sees the "almost bewildering varieties of semi-warlike methods of aggrandizement as part of a concerted grand strategy" (p. 123). But he should, by way of proof, have indicated how and where this good strategy is conceived, and a Table of Organization would have shown how the tasks are distributed among the many unconventional-warfare agencies and how their activities are coordinated. The author has restricted his case study of Communist unconventional-warfare activities to the last fifteen years. This is in a way regrettable because some of the most instructive examples of this new warfare can be found in the World War II period. Communist activities in France in 1940 are still a blueprint for subversion; the formation of the Free German Committee in 1943 is still a vivid illustration of political warfare; and Tito's partisan war in Yugoslavia—1941–1945—still provides a perfect pattern for revolution. That "the guerilla war in Malaya has almost become a copybook model of its kind" (p. 161) is hardly true with regard to the Communists' conduct of the military operations; I should have thought that the war in Indo-China has a distinctly better claim to top honors, in the military as well as in the political-sociological field. And should not the overthrow of Czechoslovak democracy by Communists (1948) have been treated as the most notorious example of nonbloody transition to socialism?

I cannot share the author's conviction that the British, too, had failed during the last war to understand the Soviet grand strategy (p. 229); surely Sir Winston Churchill's moving Introduction to Chapter XXVII of the last volume of *The Second World War,* as well as Chapter XVIII, show the opposite. Finally, the author's historical survey of the "American Experience in Unconventional Warfare" (pp. 208–270) might have contained a reference to the "vehement and costly exertions, even of a military character"—Sir Winston's words—of the United States in Greece from 1947 on.

All this should not detract from the merits of the book. While the author is not the first to deal with the subject in this context, he has not only brought it up to date, but has also contributed many new facets. The book should be widely read.

OTTO HEILBRUNN

Gerrards Cross
Bucks
England

CHE GUEVARA. *Guerrilla Warfare.* New York: Monthly Review Press, 1961. $3.50.

Major Guevara's book is important in itself because of the personality of the author and his role in Latin-American affairs. But it is something more than an exercise by a prominent left-winger; it is an interesting document.

The book is divided into three chapters, two appendices, and an epilogue. It deals with the technique of guerrilla warfare and defines its essence, strategy, and tactics.

The guerrilla band is presented and analyzed, rather summarily, and finally the organization of the guerrilla front is described. To say that Dr. Guevara knows nothing of guerrilla warfare that was not known by others before him is a truism. But the book is noteworthy nevertheless. This little opus in fact, though dealing with such practical topics as tank traps and refuges against mortar fire, has an unmistakable nineteenth-century flavor. It recalls the writings of Auguste Blanqui on the organization of riots and on the building of barricades. The work belongs to that genre in which politics and warfare are inextricably enmeshed. It is a canon of militant Marxists that theory and practice are to be considered as one entity, and herein lies the interest of this book.

The basic and final thesis is that guerrilla warfare can be successful only when the population is in favor of the *guerrilleros* and is willing to aid and shelter them; when it is willing to withhold any information from the regular army, thus giving the *guerrilleros* an advantage over the regular army, no matter how powerful or well organized. Guerrilla warfare is seen here as part of the revolutionary process which, in Dr. Guevara's mind and in the minds of people of his persuasion, is a "historical" process with an element of fatality that adds to it an almost religious element: the *credo quia absurdum* is quite transparent throughout this exercise in logic and logistics.

Writing about guerrilla warfare in Spain at the outset of the nineteenth century, Sir William Napier said: "It is in such warfare that habits of unbridled license, of unprincipled violence, and disrespect for the rights of property are quickly contracted and render men unfit for the duties of citizens." Guevara reverses the process. The state of illegality and confusion is to be understood as the beginning of a new order. The *guerrilleros* are the natural leaders of the new order because they, and the people with them, have upset the old. The fact that *guerrilleros* cannot live in what was an orderly society allows them to lead, in fact to coerce, a society to their kind of order.

The "Analysis of the Cuban Situation" which concludes the book is somewhat absolete because of the rapid occurrences on the island. It does not say anything which has not been already said by official Castro sources. It does contain an ominous warning: Should Cuba be overrun by a well-organized and powerful army, the whole population would engage in guerrilla warfare and is now trained for it.

This book is of great interest to people who follow Latin-American affairs and are aware that conventional methods of warfare are not very effective in underdeveloped areas. Its ideology is Marxian to an almost childish point, and the oversimplifications of the political situation are to be taken for what they are. They are not logical to this reviewer, but they contain all the logic that the author can muster while following a way of thought which he has not determined and from which he cannot deviate.

RENZO SERENO

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BRYCE WOOD. *The Making of the Good Neighbor Policy*. Pp. x, 438. New York: Columbia University Press, 1961. $7.50.

Based on protracted research in the State Department archives and the Franklin D. Roosevelt Library at Hyde Park and copiously annotated, this book analyzes the making of the Good Neighbor policy in the period from 1927 to 1943. It is primarily a book for specialists, but anyone who is seriously interested in inter-American relations will find it very rewarding. Its chief merits lie in its emphasis on ideas, its refinement of the analysis, and its abundant documentation. It does much more to correct and amplify the details of the process than to alter its major outlines.

As others have done, Bryce Wood distinguishes three main stages in the development of the policy. The labels are different and suggestive: to 1933, the "renunciation of domination"—Dean Acheson's phrase; then the "anticipation of reciprocity"—paraphrased from Sumner Welles—to 1939; and after that, the "evocation of reciprocity"—Wood's phrase—in the development of wartime continental defense. The chief novelty here lies in Wood's claim—which is open to question—that the third stage produced a "new" Good Neighbor policy.

Similarly, the book confirms the established view that Cordell Hull and Sumner Welles were the chief architects of the policy. It does, however, bring out more clearly than ever before the important, though lesser, roles played by Franklin Roosevelt, Lawrence Duggan—Welles' chief lieutenant in the State Department, and Josephus Daniels—ambassador to Mexico.

The best part of the book is the one dealing with "pacific protection" in the second of the three stages described above, and in this section the outstanding chapter is the one dealing with the successful effort at collaboration with Venezuela in the settlement of the thorny problem of petroleum. Little noticed at the time despite its great importance, this story is told here with an abundance of fresh and illuminating details.

Another feature of the book, which is of burning interest today because of the Cuban situation, is its account of the discussion—largely behind the scenes—of the possibility that the Nazi-Fascist threat might compel the United States to revert to forcible intervention in Latin America in self-defense. Roosevelt was apparently disposed to take such action if necessary. Welles held the action unnecessary and public discussion of it inadvisable. If a Nazi-Fascist "danger spot" should develop, he said, "our neighbors would join with us to remove it."

The book arouses dissent at a number of points. Its account of the origins of the Good Neighbor policy before 1933 is misleading. For a book on ideas, its definition of "intervention" is too narrowly official and its definition of "policy" too fuzzy. It makes far too much of the flash-in-the-pan Butler report of 1943. And the short shrift given by the author to the important series of inter-American conferences from 1933 to 1942 is explained (p. 328) in a passage the logic of which escapes this reviewer. Nevertheless, its merits make this book a "must" for specialists.

ARTHUR P. WHITAKER
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HERBERT L. MATTHEWS. *The Cuban Story.* Pp. 318. New York: George Braziller, 1961. $4.50.

Since World War II I have been convinced that irresponsible journalists have done more harm to the relations of the United States with Latin America than any other group of people—including some very irresponsible diplomats. Support for this opinion now comes from the author of this book, himself a leading journalist with a particular interest in Latin America. On page 118, he writes: "In Cuba, nothing was more helpful to the Reds than the fact that the American press, radio and television, Congress and many American diplomats and businessmen conceded victory to the Communists long before they had won it." This work is filled with positive personal criticism of many individuals, and the United States Government and its State Department officials come in for their share and more of frank and feeling comment and criticism.

Mr. Matthews' book is a first-person story and reads in places like fiction. It is news-reporting and it is editorializing. It is interpretative, critical, defensive, querulous, and emotional. It is often dogmatic and sometimes peevish. It is the last word. It is Mr. Matthews' voice of experience crying in the diplomatic wilderness. Much of it sounds convincing, for the author believes that he has never knowingly told an untruth in his journalistic career. Unfortunately, memoirs, for that is what this book is, are often apologies as well as defenses and explanations. Some day a scholar—not a Cuban—will have to disentangle the threads of this skein, and then Mr. Matthews' record will have to be impartially evaluated in the light of other accounts. The flames of enmity and the smoke of prejudice will have to disappear before the last word can be written on Cuban parturition in the Age of Castro.

Undoubtedly Mr. Matthews knows Cuba, and he seems to understand Cubans. I once heard him say, a few weeks after the overthrow of Batista, that because of this special knowledge, several book publishers had asked him to write a book on Cuba; his reply was—not yet. Now that the time has come we have a seven-chapter story extending, except for some pre-Castro background, from the December 1956 landings in Orienté Province through the Sierra Maestra days to mid-1961. It is replete with pertinent personal experiences and observations and with many quotations, including his wife's and his own—all leading to a final conclusion that the United States by its mistakes made Castro Communist and made Cuba what he calls "Communistoid." It is too bad that so many words and so much effort were expended to prove what Latin Americanists had already concluded and what historians will certainly record.

For the time being, at least, let us not have to read any more one-sided books about Cuba! But someday, soon I hope, a book will be written which will assist the person with proper authority or influence, and with a desire and ability to learn from the facts of history, to reach a balanced judgment from which some intelligent actions will result in relation to Cuban problems and possibly in relation to Latin America also. Mr. Matthews' book does not quite accomplish this, although he lists innumerable mistakes made by many persons and makes some concrete suggestions for changes, especially in our relations with that troubled island. This book is written to put the record straight, and to correct past mistakes as Herbert Matthews sees them.

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THOMAS L. KARNES. *The Failure of Union: Central America, 1824–1960.* Pp. xii, 277. Chapel Hill: University of North Carolina Press, 1961. $6.00.

Since the breakup of the Central American Republic (1824–1839), the dream of restoring that union has obsessed leaders of Guatemala, Nicaragua, Honduras, El Salvador, and Costa Rica. On some twenty-odd different occasions, they have gathered together to draft plans, usually the same ones, and the results have always been identical—failure. Yet, the dream persists. "The significance is not that they failed and failed and failed, but that they tried and tried and tried" (p. xi). In this first English evaluation of the unionist movement in Central America, the author fixes the blame for the repeated failures upon defective representative government, growing nationalism with the passage of time, and Costa Rica's aloofness. Other contributing factors have been excessive localism in the early period of nationhood, fostered by centuries of colonial rule and by a rugged topography which hampered effective communication; lack of strong economic bonds; ignorance of the people; ambition, suspicion, and selfishness of rival state leaders, who lacked a national consciousness; and, one might add, pangs of guilty conscience for the failure of the original experiment.

Ambitious in scope, this work, which by its very nature is a survey, treats a difficult and complex topic, especially given the paucity and bias of the documentation. And yet, Dr. Karnes has done a creditable job. His study is particularly valuable for the post-1871 period; it contains a fascinating discussion of a student unionist movement which began in 1899. The analysis of the United States' actions and attitudes toward union is objective and convincing, and the description of recent co-operative moves in Central America adds timeliness to this well-written survey of an important theme in Central American history.

Somewhat less satisfactory from the viewpoint of the specialist, the book lacks depth in the treatment of the secessionist crisis from 1838 to 1840. This in turn has led to some superficial conclusions about the unionist movement in the crucial decade of the 1840's. The chapter on "Great Britain and the Federation" corrects many mistaken notions held by "Liberal" historians in the past, but, unfortunately, it ends by building an equally distorted picture of English noninterference. The documentary base for that chapter, moreover, is hardly adequate to support the aggressive conclusions it presents. But these, after all, are the observations of a specialist, engaged in a detailed study of that period, and should not detract from the merits and over-all utility of this volume.

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JOHN W. F. DULLES. *Yesterday in Mexico: A Chronicle of the Revolution, 1919–1936.* Pp. xvi, 805. Austin: University of Texas Press, 1961. $8.50.

The modest proposal to present but a bare political chronicle of the middle years of the Mexican Revolution is adhered to faithfully by the author. The book revolves about the rise, the rule, and the decline of *El Triángulo Sonorense,* composed of De la Huerta, Obergón, and Calles, the leading political actors of Mexico from 1920 to 1935. Nowhere does the author satisfactorily justify his choice of this period for study, nor does he treat of the social, ethnic, cultural, economic, and ideological ferment of these postrevolutionary and interwar times of searching, confusion, corruption, idealism, and fanaticism. And yet, even this spare recital of political facts takes on a life of its own, an excitement growing naturally out of the materials and undoubtedly assisted by the uncompromisingly flat treatment, unanalytical as it is, mere *recitativo* that it is. A re-creation which allows the informed reader to stamp the monk's cloth of recitation with the emotional images of his own experiences and biases is the great stylistic triumph of this book.

Obviously Mr. Dulles' work is not as objective as it appears. The mere choice of subject is a commitment, of course, and there are theoretical premises hidden behind his creation of a political chronicle, instead of an economic, social, or artistic one, for example. And even a chronicle must pick and choose among the materials to present what the author may consider relevant. Latin Americans will wonder why this book does not contain more discussion concerning the United States, and why the role of ideas in political action is so neglected. American social scientists will look in vain for any treatment of the relationship between social structure and public affairs, or even for some theoretical view of the role of leadership, which is after all the central theme of the work. But no matter—let us respect the self-imposed limitations of the author, and accept the study for what it is: a most useful statement of the overt political facts of a fascinating period, and an uncommonly good initiation for the ingenuous into some of the internal complexities and realities of Latin-American politics.

The definitive treatment of this difficult developmental period of the Mexican Revolution is yet to be done. Much of what has occurred in that country after 1940 must remain unexplained if the essential failure of the developmental years to build a firmly committed and participant social base for the Mexican nation is not taken into account. Withal, Mr. Dulles can be sure that he will occupy an honored place in the fomenting of any further research on this period.

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EUROPEAN GOVERNMENT AND HISTORY

RICHARD PIPES (Ed.). *The Russian Intelligentsia.* Pp. 234. New York: Columbia University Press, 1961. $4.50.

At the beginning of one of the essays that make up this amiable, if not remarkably profound, symposium, Leopold Labedz reproduces a conversation which reportedly occurred in an elegant Russian restaurant not long before the Revolution. An English writer, a French diplomat, an American war correspondent and two Russians, one a journalist, the other a member of the Duma, were discussing the Russian intelligentsia. They agreed, finally, that "an intelligent is an intelligent." When to this simple conclusion is added their observation that an intelligent is "one who thinks and talks and writes of change," it would seem that detailed scholarship cannot sum up its subject much more adequately than this pleasant conversational exchange has. It is this kind of semi-instinctive sense of what the Russian intelligentsia was—and, in some few individual instances, may still be today—that illuminates the gap between the past and—what by official definition passes for—the present intelligentsia in Russia. In the Soviet Union, as Mr. Pipes indicates, "anyone engaged in non-physical labor, whether he be a lyric poet or a veterinarian" is classed as intelligentsia. Or as Benjamin Schwartz puts it later on, it is the "new professional and managerial class that hardly remembers the [pre-Revolutionary] past" to which the term "intelligentsia" is applied in the Soviet Union.

Somewhat less than half the volume is devoted to papers which attempt to analyze the term "intelligentsia" and to trace its historical evolution in tsarist Russia. Some of the past glory of the Russian intelligentsia is recaptured in these essays by Martin Malia, Leonard Schapiro, Boris Elkin, and Richard Pipes. A larger section of the symposium is composed of essays which deal with "the Soviet intelligentsia," and especially with the situation in Soviet Russia subsequent to Stalin's death. Benjamin Schwartz compares the Russian and Chinese intelligentsia, and an essay by Julián Marías treats of the intelligentsia in Franco's Spain. The body of the volume is filled out with documents, a glossary of terms, and an index.

Taking the volume as a whole, this reviewer is forced to conclude that, despite the positive aspects already mentioned, there is a certain lack of freshness, a rather dead quality, which attaches to the areas dealing with the pre-Revolutionary Russian intelligentsia.

Paradoxically, Julián Marías' contribution on the Spanish intelligentsia emerges as the most lively and informative of the papers, although even here it should be pointed out that much of this essay is in fact a running summary of the literary and intellectual situation in twentieth-century Spain, starting with "the generation of 1898."

DAVID HECHT

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R. CONQUEST. *Power and Policy in the U.S.S.R.: The Study of Soviet Dynastics.* Pp. x, 485. New York: St. Martins Press, 1961. $7.95.

This book is a study of Soviet dynastics, based upon the official publications of the Soviet Union, the hypotheses constructed upon experimental techniques developed by students of Kremlinology, and certain detective guesses. It is not at all a history of the Soviet Union, but an impressive interpretation of events in a continuing struggle for personal power and status within the Soviet leadership. The author examines the forces struggling for ascendancy and the groups with similar economic interests tending to act together politically and sketches the forms of social stress and ideological considerations affecting policy decisions of the Soviet Union.

On the question of Khrushchev's secret speech denouncing the late tyrant Stalin at the Twentieth Congress (February 19, 1956), the author cites the repercussions within the top Soviet leadership and among foreign Communist leaders over the various versions published abroad. He notes that Khrushchev accused Allan Dulles of issuing an American translation that "contained fabrications." In spite of all official denials, it would be naive to assume that Politburo members were executed by the police without the complicity of Stalin.

The second and third parts of this book form a substantive account of the struggle for power (1948–1953) under conditions of Stalin's "One-Man Rule" and of that of 1953 to 1960 under conditions of Khrushchev's "Collective Leadership." After tracing Malenkov's 1941 attack, Zhdanov's 1946 attack, and Stalin's tortuous attack (1946) with a "septet" against the Politburo, the author deals with all the most notorious and noxious cases of the 1950 period.

The Leningrad Case, 1949–1953, included the production of palpable forgeries for a purge of Voznesensky in a manner reminiscent of the earlier purge of Kirov's men. Another historic case examined was the arrest, in November 1952, of a distinguished group of "saboteur-doctors" for their plot to cut short the lives of public figures "through sabotage medical treatment," which almost resulted in a great anti-Semitic purge. When Stalin's death was announced, the streets of Moscow were filled with Soviet Ministry of Internal Affairs (MVD) troops. The Moscow district, Moscow garrison, and Kremlin garrison commanders remained, it may be noted, at their posts until after the coup of June 26, 1953, when Beria was arrested.

Khrushchev was by 1956 at the head of a Praesidium, Secretariat, and Central Committee which denounced the cult of personality and supported the principle of collective leadership. The group which opposed the new leader was defeated finally through a counter coup by the party apparatus, the security police, and the army.

However, in the autumn of 1957 Marshal Zhukov, Minister of War, was suddenly expelled from the Praesidium, the Central Committee, and his Ministry under serious political charges.

The author forecast the general ways in which the continuous struggle within the party leadership might develop to the Twenty-Second Congress of this autumn. He asserts that the very nature of Communist rule teaches us that a struggle will continue—accompanied perhaps by extraordinary crises. Regarding tensions between Soviet and Chinese Communists, the point of view of all elements in the Soviet Union is that the Chinese interpretation of Marxism-Leninism, internally in the Communes and externally in the attitude to war, forms "the crudest and most unacceptable of leftist adventurist deviations."

This scholarly work gives the general reader clear and invaluable insights into the nature of the Soviet political world as well as the special characteristics of the members of the Soviet ruling groups. Ten excellent appendices and an index add to the value of this study for the serious student.

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JOHN A. ARMSTRONG. *The Politics of Totalitarianism: The Communist Party of the Soviet Union from 1934 to the Present.* Pp. xvi, 458. New York: Random House, 1961. $7.50.

Amid vast libraries of books dealing with Russia since 1917, it is remarkable that very few have been devoted to a systematic historical record of the Marxist Party which has ruled Muscovy since the October Revolution. These include Yaroslavski's four-volume work, revised on Stalin's orders into a two-volume work; the memorable *Short Course* of 1938—a Stalinist exercise in self-glorification, denounced by Khrushchev at Congress XX in 1956; the *History* of 1959, first published in the new journal *Voprosy Istorii KPSS;* and, among Western contributions, Leonard Schapiro's excellent work, *The Communist Party of the Soviet Union* and John S. Reshetar's admirable *Concise History of the CPSU.*

To this small pile, a young Wisconsin Professor, John A. Armstrong—author of *Ukrainian Nationalism* and *The Soviet Bureaucratic Elite*—has added another tome. His chapters comprise a readable and lively narrative, meticulously documented. They cover much familiar ground. Only occasionally do they add new data or new insights. The auspices of the book are somewhat puzzling. It is presented as "Part III" of a study sponsored by the "Research Program on the History of the Communist Party of the Soviet Union" (Columbia University and the Ford Foundation), of which Part I is some work by Harold H. Fisher—not otherwise identified and evidently not yet published—and Part II is Schapiro's volume—which Armstrong overlaps in chronology and does not notably transcend, or even equal, in the quality of his analyses. His supplementary mimeographed "Essay on Sources"—a useful annotated bibliography—was issued by the Department of State.

In this circumstance, I suspect, we have the clue to the uses and limitations of Armstrong's book—which is typical of most American studies of the Soviet Union. Soviet scholars cannot understand America because they are obliged by party pressures to view the United States through the distorted lenses of Marxism-Leninism. American scholars cannot understand the Soviet Union because they are obliged to view Russia through the distorting lenses of anti-Communism. All "sponsored" Ameri-

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can studies of Russia must conform to certain standards—for example, almost total neglect of the immense economic and social transformation of the Soviet community in the epochs of Stalin and of Khrushchev, without which the "history" of the party is meaningless; emphasis on "palace gossip" and on the abuses and horrors perpetrated by the oligarchs, never on their creative accomplishments; and scrupulous avoidance, even in elaborate bibliographies, of any mention of any Western writer who has ever perceived anything even slightly meritorious in any of the words or deeds of the rulers of the Soviet Union. These are the preconditions in American studies of the Soviet Union made with university sponsorship, foundation subsidies, and governmental approval.

Armstrong's book exemplifies the model. Its final sentence, without evidence or critical discussion, depicts the Communist party of the Soviet Union as "the center and buttress of a world wide complex with unlimited aims of aggrandizement." Such ethnocentric and paranoid attitudes, fully paralleled in Soviet "scholarship," will never enable Americans to understand Russians or Russians to understand Americans. Armstrong has written a useful work. But he has made no contribution toward the resolution of a dismal and potentially tragic impasse in American-Russian relations.

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BURNETT BOLLOTEN. *The Grand Camouflage: The Communist Conspiracy in the Spanish Civil War*. Pp. 350. New York: Frederick A. Praeger, 1961. $6.50.

Spain and recent Spanish history seem to be again attracting in the United States and Great Britain the attention which they merit. After a lengthy hiatus caused by many reasons, perhaps, revulsion aroused by the Franco regime and, certainly, the difficulties of working with polemical and often incomplete sources, authors like Hugh Thomas in *The Spanish Civil War*, Arthur P. Whitaker in *Spain and the Defense of the West,* and Stanley G. Payne in *Falange: A Study of Spanish Fascism,* have grappled with considerable success with thorny themes of the Peninsula.

Two of the most important studies of the Spanish Civil War are by David T. Cattell, one entitled *Soviet Diplomacy and the Spanish Civil War,* the other, *Communism and the Spanish Civil War*. It is the latter excellent monograph which lies squarely across the track of Mr. Burnett Bolloten's *The Grand Camouflage*. Briefly, Mr. Cattell told the story earlier than, and at least as well as, Mr. Bolloten.

The Grand Camouflage describes with exceptional clarity—the result of the author's stylistic skill but also of his unchanging focus on one aspect of a many-sided situation—the success of communism in penetrating and dominating the government of the Spanish Republic from 1936 to 1939. Loudest in support of the democratic republic, tenacious in persuading or compelling their Socialist and Anarchist opponent-allies to their own ends, and most efficiently organized, the Communists ceaselessly pursued their objectives. Mr. Bolloten traces the internal political struggles which they precipitated in Spain up through the fall of Largo Caballero's cabinet in May 1937. The author, who was born in Wales and reported from Spain during a period of the Civil War, has skillfully employed an extensive array of newspapers, party pamphlets, written and oral interviews, and printed memoirs to tell this dramatic, vital story. But this study is not "historical news": Mr. Cattell did the job well and first, and he carried his history through to the end of the war, as Mr. Bolloten inexplicably fails to do.

And there was not as much mystery about what the Communists were doing in Spain as Mr. Bolloten's title and treatment imply. George Orwell learned quickly enough what was happening to "his" left, and told the sorry tale—in *Homage to Catalonia*—in 1937. The Communists themselves made no secret of the fact that they were supporting the Republic on a short-term basis. André Marty, a member of the Executive Committee of the Comintern, wrote an article in August 1936, which was published in every country where there was a Communist periodical. Marty said: "In a country like Spain, where feudal institutions and roots are still very deep, the working class and the entire people have the immediate and urgent task, *the only possible task*—and all recent appeals of the Communist Party repeat it and prove it—not to bring about the socialist revolution, but to defend, consolidate, and develop the bourgeois democratic revolution." (This statement is quoted on page 101 of *The Grand Camouflage.*) The fact is that the Communists employed no camouflage except that of not specifying that they were fighting only for themselves and for the Soviet Union. And opponents and sympathizers put their heads in the sand or looked at the stars or threw dust in each other's eyes, forgetting only one fact: that the Communists were unlikely to have surrendered their final goal.

Mr. Bolloten's book is more detailed for the period which it covers than any existing account. The reportorial quality of his historical writing is superb: see, for example, his chapter on "The Iron Column." But if the book's title were "The Grand Spanish Deception" it would be more realistic, and if Mr. Bolloten had not expended the twenty years which, as he acknowledges in his Foreword, it cost him to write this book, he might have had an important historical "scoop," rather than a competent, if partial, development of a twice-told tale.

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CARL ERIK KNOELLINGER. *Labor in Finland.* (Wertheim Publications in Industrial Relations.) Pp. xii, 300. Cambridge, Mass.: Harvard University Press, 1960. $6.00.

The hard destinies of the four million people inhabiting Finland have created economic and mental conditions which are conducive to strong antagonism and incessant strife and struggle at all levels. Nevertheless, in spite of internal conflicts and external pressures, the Finns have managed to avoid hysterical political solutions and to maintain a democratic political system and a Western way of life.

Professor Knoellinger, of the Swedish University of Abo, Finland, has given us a birds-eye view of the turbulent development of Finnish workers' and employers' organizations and their mutual relations. It could be called a history of labor in a developing country.

The author has confined himself mainly to a description of historical events during the twentieth century and of the institutional framework, all in concrete terms. In a somewhat sketchy analytical chapter, a number of more theoretical questions are discussed. Has, for instance, the organizational weakness of the trade unions—their low membership and factional rivalries—made the wage development more or less inflationary than one could have expected with a stronger—and at the same time more "mature," centralized, and self-confident—trade union movement in the same economic circumstances? Another problem discussed by Knoellinger is the one which led to the recent split of both the Social-Democratic Party and the trade union movement: whether a less aggressive trade union policy would be conducive to better results for the workers in terms of the relation between wages and prices. The question of whether prices chase wages or wages chase prices is naturally kept in mind as well. Knoellinger's discussion of these and allied problems is not conclusive, something that might be regarded as unavoidable.

Although the problems of Finland are largely unique, the Finnish experience may to some extent be representative of those of a rural country trying to make up for its economic lag. One can subscribe to the words of Professor Galenson in the Foreword that the author has provided a wealth of material from which students of economic development, labor history, and labor economics have a great deal to learn.

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HUBERT RIPKA. *Eastern Europe in the Post-War World.* Pp. xv, 266. New York: Frederick A. Praeger, 1961. $5.95.

The most important point to remember when reading this book is that Ripka was high in the Ministerial Councils of President Beneš' government after World War II, and was forced to resign in 1948 when the Communists seized power. He then emigrated to England and the United States. What the overenthusiastic eulogy by Hugh Seton-Watson—in the Introduction—does not tell us, is that Ripka had been a strong supporter of Stalin and became one of the most bitter opponents of Stalin's policies only because of Stalin's opposition to the Marshall plan (pp. 75ff).

The present work is thus, more or less, a meek apology for the role Ripka and Beneš played in world politics by trusting Stalin. The reviewer could find, for instance, no mention that Beneš was the first Western statesman to visit Stalin, formally, during World War II against the direct advice of his Western friends. Seton-Watson disposes of this difficulty by claiming: "It is easy in 1961 to look back and to criticize President Beneš for mistakes in his policy, in particular for his willingness to trust his Soviet ally" (p. ix). But he is also right to point out that we should remember that the British forced the Munich surrender in 1938.

Otherwise, Ripka's presentation is a pretty good survey of the general trends going on in Central-Eastern Europe under the Soviet hegemony. After a brief overview of the area's past history, he outlines the economic, social, cultural, and religious differences among the various countries and the differences in their political regimes before World War II. He then analyzes the rivalries of the great powers, Soviet rule, the Polish rebellion, and other problems concerning the Iron Curtain countries—such as the rising influence of Communist China, Tito's quarrels with the Kremlin, and the general unrest in the satellite countries. His most important conclusion is that "the revolutionary forces in the Soviet empire will not be able to achieve the liberation of the enslaved peoples of East Central Europe without effective political aid from the Western Powers" (p. 242). Academically speaking, the work suffers from the lack of a bibliography, and the few references scattered here and there certainly do no justice to the numerous systematic studies available today in the United States on every point covered by Ripka. But Ripka was also a professional journalist, and his presentation is certainly a readable introduction to what is going on in the Soviet colonies in Central-Eastern Europe.

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The Holstein Papers: The Memoirs, Diaries and Correspondence of Friedrich Von Holstein, 1837–1909, Vol. III: *Correspondence, 1861–1896.* Edited by Norman Rich and M. H. Fisher. Pp. xv, 665. New York: Cambridge University Press, 1961. $17.50.

The third volume of *The Holstein Papers* comprises the letters written and received by Holstein from 1861 to 1896. Holstein had destroyed the greater part of his own letters before 1880, and the documents dating from 1861 to 1880 are consequently, in the majority, made up of letters addressed to him. In 1880 Holstein began the practice of making drafts or copies of his own letters, and this innovation coincides, curiously enough, with his decision to keep a diary of his activities and to jot down certain reflections in the manner of memoirs. It is difficult to say just what prompted this change of habit. The editors have found no rationale in his method, nor can the many gaps in his correspondence be satisfactorily explained. Some letters of a self-incriminating nature were apparently destroyed, while others equally condemnatory were preserved.

The significance of this publication as a source for European diplomatic history can hardly be overrated. It complements and, in certain instances, surpasses the volumes of *Die Grosse Politik,* since the Holstein letters are of a more intimate nature and reveal important gradations in Holstein's thinking and strategy during the years when he was one of the policy-makers in the German foreign office.

This brief review allows me to do no more than point out the most salient problems on which new light is shed. We receive fresh and revelatory information about the Arnim affair; Bismarck's policy toward France, Austria, Russia, and England is discussed in great detail, and the formation of the Triple Alliance becomes considerably clearer. The illness of that hapless crown prince, Frederick William, holds our interest for several pages. Bismarck's dismissal stands out in clear relief as a catastrophe, at least in the light of German foreign policy. From many of these letters the figure of Herbert Bismarck emerges in tragic aspect, and the reader will await the forthcoming publication of his letters—edited by Walter Bussmann—with keen anticipation.

For the decade following 1890, the unpredictable personality of the Kaiser overshadows most of the other problems then looming on the international horizon. The correspondence which gives so much significance to this volume flows on throughout the entire period: the letter from Prince Bismarck, letters from his sons, Bill and Herbert, from Chlodwig Hohenlohe, Prince Bülow, Paul Hatzfeldt, Kiderlin-Wächter, Philip Eulenburg, and many lesser German diplomats.

However, the psychological enigma that was Holstein is not to be deciphered from a reading of these letters. The historian is still groping his way into the basic motives of his character and into the sources of power which gave him the position he occupied until his resignation in 1906. Nor can it be said that the dark shadows clouding his reputation have been in any way dispelled by his correspondence. On the contrary, he remains the suspicious, distrustful recluse, faithless in friendship, revengeful in enmity. Our final judgment must, of course, be reserved until the later part of the correspondence comes to hand.

The Holstein papers are not, however, interesting to the diplomatic historian alone. To this reviewer they offer a most telling indictment of the aristocratic upper crust then in charge of Germany's foreign policy. The analyst of foreign affairs and the social historian of Wilhelminian Germany will both reap the rewards which this volume offers.

The editors deserve high praise for the impeccable presentation of these papers. The translation is clear, and the comments and annotations are thorough and accurate.

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P. H. J. H. GOSDEN. *The Friendly Societies in England, 1815–1875.* Pp. x, 262. New York: Barnes and Noble, 1961. $6.50.

The Friendly Societies of England are difficult for the American student to understand, since there is nothing quite comparable in this country. Yet without a knowledge of these distinctive institutions, it is impossible to understand the spirit of the English working people. Friendly Societies were organized by the working people to provide social life and a modicum of security against the casualties of sickness and death.

The dual purpose of Friendly Societies caused continuous difficulty, as the desire for fellowship was rarely conducive to good money management. Frequently members spent more toasting each other than they contributed to the benefit fund. With the gradual improvement of acuarial tables and the higher income of the artisan classes, the unstable social clubs were transformed into more reliable mutual benefit societies. This transformation of local clubs into affiliated lodges under central management is the principal theme of this book.

The national government early took a hand in the transformation of the social clubs into benefit societies. The purposes of government intervention were the encouragement of self-help and the reduction in the cost of poor relief. The most important legislation, the Sir George Rose Act of 1793, enabled the Friendly Societies to register without paying the usual legal fees. Registration provided a privileged legal status which placed their funds under the protection of the local courts. Later on, the Friendly Societies were able to deposit their funds in savings banks at a preferred rate of interest.

The Friendly Societies were quick to take advantage of the privileges conferred upon them by a benevolent government.

According to the Poor Law Returns of 1803, there were 9,672 Societies with 704,350 members. The membership had grown to more than nine hundred thousand by the end of the Napoleonic War, and it continued to grow during the rest of the century. In 1872 a Royal Commission estimated the membership of registered and unregistered Societies to be nearly five million, a number which far exceeded the membership of both the trade unions and the co-operatives.

Mr. Gosden is primarily interested in the later growth of the Friendly Societies. He carefully describes the organization and plots the distribution of the affiliated orders, such as the Manchester Unity of Oddfellows and the Ancient Order of Foresters, which recruited their members from the better-paid artisans. In telling the story of the growth of these affiliated orders, Mr. Gosden has added to our understanding of the aspirations and achievements of the English working classes.

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F. J. FISHER (Ed.). *Essays in the Economic and Social History of Tudor and Stuart England.* (In Honor of R. H. Tawney.) Pp. 235. New York: Cambridge University Press, 1961. $5.50.

There is no more controversial epoch among English historians today than the century which divides the Reformation from the outbreak of the Civil War under Charles I. This concentration of interest has coincided with a change in emphasis from political and religious to social and economic questions. Both for the intensification of enquiry and for the change in emphasis, Professor R. H. Tawney has been largely responsible. Whether the shift in emphasis has gone too far is perhaps not a question to raise so near to the eightieth birthday of a great and generous-minded teacher. After all neither Tawney himself nor the best of his disciples have ever claimed that economic and social history provided all the answers, though they do seem in England nowadays to provide nearly all the thesis subjects.

Professor Fisher, Tawney's successor at the London School of Economics, has brought together an impressive group of essays as a tribute to the master. He himself in an essay called "Tawney's Century" and Mr. Christopher Hill in "Protestantism and the Rise of Capitalism" provide some helpful reflections on the character of the epoch. The other essays deal with particular and detailed aspects of the English scene. Maurice Beresford on the theory and practice of enclosure in the mid-seventeenth century and Joan Thirsk on the growth of regional domestic industries add to our knowledge of rural development. Aspects of administration are covered by Mr. Lawrence Stone's analysis of the gains made in office by the first Earl of Salisbury (1596–1612), and by Mr. G. E. Aylmer's examination of the personnel of the Exchequer under King Charles I. Mr. Robert Ashton demonstrates the same King's astonishing ineptitude in handling the business interests of the City. Mr. D. H. Pennington in "The Accounts of the Kingdom 1642–1649" presents much valuable information about the financing of Parliament's war, and Mr. D. C. Coleman contributes a useful study of Sir John Banks, who made a very good thing out of providing ready money for an embarrassed government in the 1670's.

All in all, this little volume contains much new information and offers some useful pointers toward further enquiry. Yet it seems strange that in a book of social and economic studies devoted to the history of a maritime people at a period of significant expansion only one essay—that by Mr. Ralph Davis on "England and the Mediterranean"—should deal with foreign trade and none with colonial ventures. The weakness of English seventeenth-century scholarship today is not so much its concentration on economic factors as its almost undeviating insularity.

C. V. WEDGWOOD

DENYS HAY. *The Italian Renaissance in Its Historical Background.* Pp. xii, 217. New York: Cambridge University Press, 1961. $5.50.

Professor Hay admits to a sense of "foolhardiness" in attempting a general sketch of the Italian Renaissance. The problem is twofold. He knows that in a sense he is following in the footsteps of Burckhardt, for whom like so many of us he feels renewed admiration; and, on the other hand, his book may appear presumptuous because the masses of specialized Renaissance studies during the century since Burckhardt make responsible generalization extraordinarily difficult. Hay has nevertheless chosen to make the attempt, and we should be grateful for what we may rather call his courage. His achievement does not lie, however, simply in his ability to combine in a coherent account the work of others; he has been successful above all in divesting himself of stereotypes and seeing his subject freshly.

The result is an emphasis on variety and change. The author believes that there was a Renaissance, which he describes as a drastic shift in "the style of living," characterized by the dominance of lay interests and the acceptance of worldly—though not necessarily antireligious—values, evident by the middle of the fourteenth century, and influential to about 1700, when another basic shift in human attitudes may be discerned. In keeping with the emphasis of most recent scholarship, Hay is insistent on the close relation between the cultural Renaissance and political and social conditions, which varied widely throughout Italy. Hence Hay is quite aware that many parts of Italy participated very little in the Renaissance, and that even its essential Florentine chapter must be divided into phases corresponding to the changing social and political scene. It is particularly necessary to trace the development of Florence from republic to principate because only in this way can the historian explain how a culture closely related in its origins to the republican traditions of a free city proved so attractive to aristocratic and princely northern Europe. Gone entirely from this flexible and nuanced picture are the stock conceptions of individualism, the state as a work of art, and humanism as an explicit philosophy of life.

It may be that here the author has tried to do too much in too little space—perhaps the consequence of trying to combine a plan for a general book with an invitation to deliver a short series of lectures. The problem of balance between detail and generalization has not always been well solved, and certain statements inevitably seem to call for qualification or elaboration. The recurrent preoccupation of the author with the problem of Italian unity after he had rejected its relevance to the Renaissance is also difficult to understand. Nevertheless, the book is full of skillful summaries and particular insights.

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SIDNEY PAINTER. *Feudalism and Liberty: Articles and Addresses of Sidney Painter.* Edited by Fred A. Cazel, Jr. Pp. x, 313. Baltimore: Johns Hopkins Press, 1961. $5.50.

Sidney Painter, author of eight books on medieval history, died early in 1960. This volume of his *kleine Schriften* is a welcome and fitting memorial to a scholar who contributed greatly to the study of medieval history in America. In it his student, collaborator, and friend, Fred A. Cazel, Jr., has collected all of his historical writing, except reviews, which does not appear elsewhere within book covers. There are twenty-five articles and addresses, including three not previously published.

For the general reader, four articles are outstanding. Painter thought and wrote lucidly about the nature and problems of government. In "The Responsibility to Refrain from Exercising Power," here published for the first time, he treats of the restraint expected of a government from feudal times to the present, and argues that World Government will remain a dream unless people can assume that it would respect their rights and liberties. "Magna Carta" and "Individualism in the Middle Ages" are clear and thoughtful articles of interest to students of political theory. "Feudalism and Western Civilization," in which Painter asserts that feudalism fostered our modern ideas of in-

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dividual liberty, is a model for undergraduate lectures surveying great ideas.

In 1935 Painter worked out "The Ideas of Chivalry," which underlies his later *French Chivalry,* and he summarized these conclusions again in 1957 in his lecture on feudalism. In these pieces, he wrote with particular zest and humor about "courtly love," but he never resolved the contradiction of how this romantic notion influenced behavior if it was not taken seriously. In his final statement he calls courtly love "a set of ethical ideas which gradually gained ground in the minds of the knightly class," but he also says it "remained a pleasant literary conceit."

The greatest value of this volume will be for specialized students of France and England in the twelfth and thirteenth centuries, who can find here all of Painter's detailed and carefully documented articles on feudal institutions and genealogy. Among the more notable articles are those on "Castle-Guard" and "English Castles" and on the families of Lusignan and Quency. "The Lands of Ralph Fitz Hubert" and "The Earl of Clare" are printed here for the first time. The consultation of this material is greatly facilitated by a full index.

The volume includes a short *curriculum vitae* and a full bibliography of Painter's books, articles, and reviews.

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AMERICAN GOVERNMENT AND HISTORY

RICHARD DRINNON. *Rebel in Paradise: A Biography of Emma Goldman.* Pp. xv, 349. Chicago: University of Chicago Press, 1961. $5.95.

This is an excellent biography of a remarkable woman, Emma Goldman, America's outstanding anarchist. The book is well written, well documented, sympathetic but objective. Dr. Drinnon is not an anarchist but a liberal, one gathers, who would have agreed with John Dewey or possibly Roger Baldwin, rather than with J. Edgar Hoover, concerning a woman whose eloquence and courage even the police respected. This reader detects—and shares—the author's impatience with the conventional American middle-class fear and hatred of Emma. But looking back on her story before World War I in the light of subsequent developments: the Smith and McCarran Acts, the Attorney General's list, McCarthyism, and the John Birch Society, I marvel that she fared no worse. However great her love of humanity, however free was she of practicing terrorism, her unconventional ideas and practices in the field of marriage and sex, her violence in horsewhipping her once-revered teacher, Johann Most, her active support of Alexander Berkman's unsuccessful attempt to assassinate Henry Clay Frick in order to cure the wrongs of the steel workers, and her generally eloquent defense of anarchists who used or advocated physical force made her anything but a precursor of Gandhi.

It was not the general violence of the Bolshevik revolution which made her its brave critic from the left, but the injustice of that violence, notably in the case of the Kronstadt sailors. I vividly remember sitting in someone's living room with Emma and a group of pro-Soviet liberals whose old affection for Emma was sorely strained by criticisms of Stalin which I was coming sadly to share. That was in 1939 when she was allowed to return for a short period to lecture and visit friends in the country which had hysterically deported her and Alexander Berkman on the *Buford*—along with 247 others—to a revolutionary paradise which had sorely disappointed these champions of anarchy.

Emma, coming to America from Russia as a relative paradise, Emma deported from America to a revolutionary Russia as to a paradise-regained, was sorely disappointed. But she never became any sort of tired radical or cynic. Dr. Drinnon somewhere observes that she was a rebel rather than a revolutionist; that is, she, as an anarchist, did not feel compelled to worry much about what was to replace what she hated as evil. But she never lost her confidence that somehow the job would be done, not even after the anarchist debacle in the Spanish civil war.

The book, especially its earlier sections, gave me nostalgic memories of a simplicity of faith that so many of us felt before World War I in progressive reforms, in democratic socialism, or in anarchism easy for men to apply to a troubled world. Its gods, then, as too largely now, were absolute nationalism, profit, and power, and their strength still is great.

NORMAN THOMAS

CLYDE E. JACOBS. *Justice Frankfurter and Civil Liberties.* (University of California Publications in Political Science, Vol. XII.) Pp. viii, 265. Berkeley and Los Angeles: University of California Press, 1961. $5.00.

In recent years there have been published a number of other books concerned with the work of Justice Felix Frankfurter, among them those by Samuel Konefsky, Charles L. Black, Jr., and Wallace Mendelson. This book by Clyde E. Jacobs is the most detailed and intensive. It represents solid scholarship. It lacks, however, the sparkle and appeal of previous studies that contrasted Frankfurter with Justice Hugo Black. Jacobs' book is more for the specialist than for the nonlegal student of public affairs who lacks patience to work through a close analysis of legal issues; but the book is worth the time and effort it demands.

The author might have given the book the following subtitle: "A Study in Pragmatic Constitutionalism"; for the intellectual portrait that is presented is that of a pragmatic jurist, one who has made the philosophies of William James and John Dewey into habits of mind.

Four chapters are devoted to the First Amendment freedoms; then there are chapters on "Liberty and National Security," "Federal Procedural Rights," and "Due Process and the Living Law." There are helpful introductory and concluding chapters and some thirty-five pages of notes.

In all the chapters, the central aspect of Justice Frankfurter's approach is apparent, in one way or another, and this has best been put by Frankfurter himself. In a letter written in 1940 to Justice Stone, Frankfurter argued that in civil liberties cases there is "the clash of rights, not the clash of wrongs," and that there is no calculus by which this clash can be resolved. But he consoled himself with the fact that the Justices of the Supreme Court are not "the primary resolvers of the clash. We are not exercising an independent-judgment; we are sitting in judgment upon the judgment of the legislature." In an article written in 1954, Frankfurter put the matter this way: "The core of the difficulty is that there is hardly a question of any real difficulty before the Court that does not entail more than one so-called principle. Anybody can decide a question if only a single principle is in controversy." This approach would lead Frankfurter to say, as William James once said to Josiah Royce, "Damn the Absolute!" The only trouble is that although James was enough of a pragmatist and pluralist to see even the need and utility of absolutes, one sometimes has the suspicion that Justice Frankfurter, unlike James, is nonpragmatic in his radical denial of constitutional absolutes.

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MARTIN L. FAUSOLD. *Gifford Pinchot: Bull Moose Progressive.* Pp. viii, 270. Syracuse, N. Y.: Syracuse University Press (Men and Movements Series), 1961. $4.50.

Gifford Pinchot is a welcome addition to the Men and Movements Series published by the Syracuse University Press.

Pinchot is best remembered, of course, as a dedicated forester and conservationist. And Pennsylvanians vividly recall—some affectionately and some bitterly—his two colorful terms a generation ago as Governor of the Keystone State. This book emphasizes neither of these, although the author grants that in Pinchot's fight for conservation were the beginnings of "many of this century's concepts of enlarged federal responsibility, vigorous presidential stewardship, and scientific planning in government."

Professor Fausold concentrates, rather, on Pinchot's role as a spokesman for Progressive party radicalism from 1910 to 1917. "Perhaps no American represented the total 1901–17 span of the Progressive movement as well as did Gifford Pinchot"; and during the latter half of this period "he affected the vital processes of the national life, adding considerably to its liberal tone." These activities from 1910 to 1917, Fausold insists, "influenced the national political structure and ideology" far more than his work as forester and governor. In presenting evidence to support this thesis, the author demonstrates sound scholarship.

Especially interesting is the account of the "ideological gap" that developed between Gifford and his brother Amos. Indeed, this book is almost a study of the brothers Pinchot rather than of Gifford alone. Although the two Progressives often saw eye to eye, Amos was by no means the worshiper of Theodore Roosevelt that his brother was.

Fausold is obviously disturbed by Gifford's strong feelings against Woodrow Wilson, which were induced by Roosevelt's and Pinchot's conviction that Wilson was highly inadequate in dealing with Germany in 1915–1916. The author maintains, however, that Pinchot's constant advocacy of domestic radicalism played a decided role "in pushing Wilson considerably to the left in 1916, and thus, with Progressive support, back into the Presidency."

Pinchot emerges from this study as a consistent Progressive who leaned toward radicalism, but could adjust to the political facts of life a little better than his brother. When he ran—unsuccessfully—against Boies Penrose in the Pennsylvania senatorial election of 1914, he was realistic enough, after a long hard look at the situation, to drop his idea of campaigning for government ownership of anthracite coal lands.

Fausold sees clearly "the existence of a political bloodline" between Pinchot and his Progressivism, the welfare state of the New Deal, and the New Frontier of John F. Kennedy.

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ROBERT GRAY GUNDERSON. *Old Gentlemen's Convention: The Washington Peace Conference of 1861.* Pp. xiii, 168. Madison: University of Wisconsin Press, 1961. $5.00.

The theme of this monograph is developed in logical fashion. The complex circumstances and conditions under which the Peace Conference met; the character of its personnel, varied in its concept of sectional difficulties and possibilities of adjustment and including many veterans distinguished by past service to the nation; the controversy in the various states over the sending of delegates to the Convention, and the mixed motivations in so doing; the strategy of the compromisers and noncompromisers as the meeting got down to business; the final program that evolved and the adverse treatment accorded it by Congress are topics analyzed at length.

The author points out that there was no effort to compromise economic issues, but he feels that a compromise on controversial aspects of the slavery question was feasible and was favored by probably a majority of the people in those states other than the seven that had seceded by the time the Convention met. This majority, however, could not effectively mobilize public opinion in such a way as to produce results; emotion ruled instead of reason. Secessionists from the South, convinced of the justice of their cause and anxious to hasten the secession of the border slave states, dubbed conciliators "submissionists" and accused them of lacking patriotism for their sections, while many Republicans from the North, convinced of the righteousness of their cause and apprehensive of a split in their ranks over compromise, regarded as traitors those who would conciliate "traitors." The Convention, in the face of opposition from delegates sent there, in some cases, to thwart conciliation proposals, finally brought forth a group of compromise proposals as a suggested thirteenth amendment to the Constitution.

This action increased Union sentiment in the border slave states, but the no-compromise sentiments of President-Elect Lincoln in his Inaugural Address reversed this sentiment.

The author understands well the play of psychological, economic, and political forces during this era of history. A key to his analysis of the operation of these forces in the Conference proceedings is suggested in the following quotation: "When appeals to patriotism, history, public opinion, friendship, flattery, and economic advantage failed to produce agreement, extremists and moderates alike impatiently called up the threat of war. . . . Each side took pains to place the onus of war on the other" (p. 69).

The monograph includes a suggestive foreword by Professor Hesseltine, an index, including the proposals adopted by the Convention with the votes on them, and an excellent bibliography.

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ROBERT J. HARRIS. *The Quest for Equality: The Constitution, Congress, and the Supreme Court.* Pp. xiv, 172. Baton Rouge: Louisiana State University Press, 1960. $4.00.

"As good almost kill a man," said John Milton in the *Areopagitica,* "as kill a good book." In other ways, too, books are like men. They are often praised for virtues they do not possess and condemned for faults that are not theirs. Such, in any event, is the fate of Professor Robert J. Harris' *The Quest for Equality: The Constitution, Congress, and the Supreme Court.*

This book is wrongly praised—in the publisher's comment on the jacket—as representing "the first complete synthesis of American political theory, constitutional history and constitutional law with regard to equal protection." It is not complete. Professor Harris confines himself, as his subtitle suggests, to the concept of equality in the equal protection clause of the Fourteenth Amendment as read and applied by Congress and the Supreme Court. It is not the first. See L. A. Warsoff's *Equality and the Law,* published in 1938.

The book is wrongly praised—in the *George Washington Law Review*—as performing "a major service" in demonstrating "that the Fourteenth Amendment is not generically as narrow as it has usually been interpreted, and that the broader federal power would be equally, if not more, plausible," and as making a "major contribution" in presenting "the thesis of secondary power in Congress to provide equal protection." Professor Harris makes no pretense of an original contribution in the discovery of the meaning of the Fourteenth Amendment at the time of its adoption. The contemporary debates and proceedings have been thoroughly combed by others. He finds my work on the Fourteenth Amendment not entirely beyond reproach, but accepts its conclusions outright as to the general scope and character of the Fourteenth Amendment, the role assigned by it to Congress in its enforcement, and the analysis of the language employed in the equal protection clause (pp. 42–44).

The book is wrongfully criticized: (1) in the *American Historical Review*—for being "written . . . around an extremely controversial interpretation of *Plessy v. Ferguson,*" controversial apparently because it cannot be shown that the framers of the Fourteenth Amendment specifically intended to do away with segregation in the schools and other public facilities; (2) in the *George Washington Law Review*—for inadequately analyzing the state-action concept; (3) in the *University of Pennsylvania Law Review*—for being unlawyerlike in offering judgments of the rightness of the Supreme Court decisions instead of simply discovering, cataloging, and reporting them; and (4) in the *George Washington Law Review*—for failure of the later chapters to live up to the promise of the first two.

Chapter One, dealing with the Greek, Roman, early Christian, and English background, and Chapter Two, covering the formulation, adoption, and early congressional application of the Fourteenth Amendment, are collative and recapitulatory.

The review of the role of the equal protection clause in business and commercial cases, contained in Chapter Three, is unduly curtailed in view of the fact that 76 per cent of all the equal protection cases fall into this area, and in view of the need for an analysis of the nature of the classification doctrine.

The author then settled down to the real work of the book: the study of the evolution of United States Supreme Court cases and attitudes on Negro-White race relations from the adoption of the Fourteenth Amendment down to the present time, through the early period of constriction and emasculation, the long middle period of latency, and the current period of partial resuscitation. Here the author is at his best. The writing is lively. The cases are sharply analyzed. The Court is portrayed as returning to the Constitution in the burial of Jim Crow.

Though the reviews mentioned make plain that we do so for widely varying reasons, all readers can agree that Professor Harris has made a valuable contribution in this highly competent study.

JACOBUS TENBROEK
University of California
Berkeley

CHARLES M. SEGAL (Ed.). *Conversations With Lincoln.* Pp. 448. New York: G. P. Putnam's Sons, 1961. $6.75.

"It is very strange," commented Lincoln to a White House visitor in 1864, "that I, a boy brought up in the woods, and seeing, as it were, but little of the world, should be drifted into the very apex of this great event." This book, *Conversations with Lincoln,* is an intensely human record of how Lincoln responded to the many challenges of "this great event," the Civil War. Charles M. Segal, a former Canadian journalist, has brought together in this collection more than one hundred and thirty recorded interviews with Lincoln, from the time of his nomination for the presidency to the day of his assassination in 1865. The result is a valuable insight into Lincoln's thoughts, moods, attitudes and actions as he attempted to meet and solve the greatest crisis ever faced by an American president. Mr. Segal is aware of the limitations of his material: some of the interviews were recorded by Lincoln's visitors many years after the event; others were recorded immediately. Some attempted to reproduce Lincoln's exact words, others paraphrased him. Even so, this collection is an important supplement to our record of Lincoln's letters and speeches, in some cases even more important, for here Lincoln is often captured in the informal, unpremeditated atmosphere of private conversation.

Some of Lincoln's visitors approached him in a spirt of friendship and admiration, others in a spirit of antagonism. To each, the President spoke his mind in a way none could mistake. The figure that emerges from these conversations is not the Lincoln of the myth-makers, but rather that of the frontier politician who suddenly found himself faced with a crisis he but partially understood, groping for solutions, and suffering the anguish of uncertainty and indecision. Here we see Lincoln just after his election, confident that the South was bluffing and that there would be no secession and war; expecting, even after the war had started, that Southern Unionist sentiment would soon right the ship of state; frustrated and experiencing mental torture over the vacillation of his generals and the defeats of the Union armies; countering the protestations of the Radicals with his blunt insistence that the war was being waged for the sole purpose of restoring the Union and that emancipation was simply a lever for the achievement of this purpose; expressing anxiety over his reelection, an endorsement he desperately wished so that he might "finish this job of putting down the rebellion, and restoring peace and prosperity to the country." Lincoln's humility, his sincerity, his humanitarianism, and his strength of purpose pervade the collection. "I must do the best I can," he said in the fall of 1862, "and bear the responsibility of taking the course which I feel I ought to take."

Readers will surely agree with David Donald, who introduces the collection, that this is "a Lincoln book which says something new."

ROBERT W. JOHANNSEN
Associate Professor of History
University of Illinois

ANGUS JAMES JOHNSTON, II. *Virginia Railroads in the Civil War.* Pp. xiv, 336. Chapel Hill: University of North Carolina Press for the Virginia Historical Society, 1961. $6.00.

Historians of the Civil War have ascribed various reasons for the fall of the Confederacy. Among these were the ineptitude of President Davis, the refusal of the Southern states to co-operate effectively with one another, the naval blockade, the moral blockade against slavery, and the lack of discipline caused by the bewildering mixture of democracy and aristocracy in Confederate ranks. Of late, emphasis has been placed upon the breakdown of Confederate defenses because of the inadequacy of Southern railroads and their unintelligent management. This was made clear a few years ago by Robert C. Black, II's *The Railroads of the Confederacy,* and now that author's thesis is fortified by Mr. Johnston's study of Virginia's principal means of communication.

Mr. Johnston rehearses the military history of Virginia during what he calls the first modern war. He uses this appellation because, in the Civil War, railroads were available for the first time in history to transport large quantities of soldiers and supplies at a rapid rate. Mr. Johnston, after prodigious research, demonstrates that this means of transportation played a crucial role in almost every military movement in Virginia. The Confederate armies often failed because of the weaknesses of the railroads. The Confederate armies' successes were attained by the skill of the generals and the heroism of the men in grey, not by the strength of the railroads. The fall of Richmond was largely the result of the celerity with which the Federals destroyed and redestroyed that city's rail connections.

Mr. Johnston proves his scholarly thesis almost too thoroughly. Military history has been written so often that the only excuse for writing it is to make it more vivid than did Douglas S. Freeman or Bruce Catton. The author of *Virginia Railroads in the Civil War* does not do this in retelling the battles of the 1860's. He emphasizes his thesis with originality; but he also meanders almost endlessly over the state's many battlefields and up and down its maze of railroads. His book is redundant. But it is a convincing contribution to the endless stream of Civil War literature. I am not bold enough to call the book tedious.

FRANCIS B. SIMKINS

Longwood College
Virginia

MARTIN B. DUBERMAN. *Charles Frances Adams, 1807–1886.* Pp. xvi, 525. Boston: Houghton Mifflin, 1961. $7.50.

This excellent biography is one of several books recently published or soon to be published about members of the Adams family. This illustrious family has had perhaps more of its members represented in *Who's Who* than any other family in American history. The current interest of historians in the Adamses was stimulated by the decision of members of that family in 1954 to make the family papers available to research scholars. From this rich mine of Americana there will appear in the months ahead several other books.

Charles Francis Adams is Mr. Duberman's first book. His meticulous research, his careful attention to significant detail, and his considerable talent as a writer mark the author as a notable contributor to American historiography. Professor Duberman, who teaches at Yale, had no competition in his project. The only book published previously about his subject was a superficial biography by one of Charles Francis Adams' sons in 1900. Doubtless there will be other books about this illustrious Adams, but none will replace this biography.

Like his grandfather, John Adams, and his father, John Quincy Adams, Charles Francis was a stanch conservative. Like his forebears, this Adams had a large measure of reserve, haughtiness, and aloofness in his personality. In spite of these disadvantages, Charles Francis Adams had a distinguished career in public service.

Adams entered politics at a relatively early age in Massachusetts, his home state. As a member of the State Legislature, he gave unreservedly of his talents to the "Conscience Whigs." Later as an antislavery leader and Free Soiler, Adams was recognized as a formidable leader among conservatives in the youthful Republican party. As a reward for his talented leadership in the National Congress, Adams, a Seward man, was named by Lincoln as Minister to England.

In his role as the United States representative at the Court of Saint James during the War between the States, Adams rendered his greatest service to his country. Although he was one of the most effective diplomats ever to represent the United States abroad, Adams was by no means the best loved or the most popular. His uncanny ability to understand completely what the problems were and how best to meet them proved his mettle as a diplomat. He realized that his job was to prevent England from joining the Southern Confederacy rather than to enlist active British support for the Federal government. That he succeeded and thus, as some have said, enabled the North to defeat the South proved his talents.

Adams served as a member of the American Commission at Geneva to settle the *Alabama* claims. His fair dealings with the British aided appreciably in cultivating more amiable relations between the two countries.

Professor Duberman's book, although not the perfect biography by any means, is an excellent one. Its impact upon American historiography will be recognized when awards are made for American biography in 1961.

GEORGE C. OSBORN
Professor of Social Science
University of Florida

RICHARD W. VAN ALSTYNE. *The Rising American Empire.* Pp. ix, 215. New York: Oxford University Press, 1960. $6.00.

Professor Van Alstyne has claimed American diplomatic history as his particular empire for more than three decades. The present volume, his third in this general field, is a revision and amplification of the Commonwealth Fund Lectures, which he delivered at University College, London, in 1956.

The Rising American Empire is actually a descriptive title because this work is definitely conceived and executed as a brief rather than merely as an analytic study of American national growth. From his long preoccupation with the variegated mosaic of our territorial development, both continental and insular, the author emerges as a vigorous exponent of imperial determinism. To him the pattern of America's expansionist mission was fixed with the first English colonies established in the seventeenth century, and the irresistible drive to empire then set in motion continued its relentless though not uninterrupted course to the threshold of the twentieth century.

The body of the book is devoted to a detailed chronicle of the successive episodes of American territorial expansion from the purchase of Louisiana to the domestication of the Caribbean. Mr. Van Alstyne's unique contribution is to be found in his chapters dealing with the period from 1775 to 1800. From source material previously untouched or little used, he extends and sharpens our understanding of the complications and contradictions of this confusing epoch. Students will find his work a useful supplement to standard sources.

Because his treatment of American political development concentrates almost exclusively upon foreign relations, it may bring into better focus some aspects of the controversial issues that crowded our formative years. The problems have been complex and multidimensional and he may perhaps be correct in his assertion that the diplomatic aspects have not received the emphasis that their importance warranted. But in his eagerness to correct what he regards as omissions or faulty interpretations, he falls into a similar error. His absorption with diplomacy is so complete that he fails to include within the compass of his own analysis the domestic forces that were also present, pressing and urgent. To this extent he has replaced one distortion with another.

Hopefully, by his own overemphasis Mr. Van Alstyne has aided future analysts to achieve a new and more accurate synthesis.

LAWRENCE H. CHAMBERLAIN
Professor of Government
Columbia University

DALE VAN EVERY. *Forth to the Wilderness: The First American Frontier, 1754–1774.* Pp. xii, 369. New York: William Morrow and Company, 1961. $6.00.

Mr. Van Every tells the story of the breaching of the Appalachian mountain barrier. His first section begins with the warnings of Pontiac's attack on Detroit, then deals with the Proclamation Line of 1763 and describes the geography of the land between the white settlement and the Mississippi and the Indian tribes that inhabited that area. A second section, entitled "The Gatekeepers," deals with the period between 1754 and 1766. The five gatekeepers, each the focus of one or more chapters, include some of the most colorful and important figures in our frontier history: George Croghan, Colonel Henry Bouquet, Sir William Johnson, John Stuart, and Pontiac. Here also, in lesser roles, are Braddock and Forbes, Washington and Gage, Cornstalk and Attakullaculla—and a host of others. The sudden horror of Pontiac's War is etched against the growing inevitability of final Indian defeat.

We are told that by 1766 the "Frontier People" were standing on the verge of a new push into the West, a great surge that was not to be stopped until they had reached the western ocean. The Iroquois, prompted by Sir William Johnson, sold out their fellow redmen in the Treaty of Fort Stanwix; the Cherokees followed a similar line of action in the South. Lord Dunmore's War brought fire and sword to the entire frontier. In the blood bath that followed, and especially when Andrew Lewis' frontiersmen stood fast against Cornstalk at Point Pleasant, the "Frontier People" became hardened to their own destiny.

Mr. Van Every has succeeded in sifting a mass of controversial and confusing data, and has prepared a narrative that is as clear and simple to follow as it is vivid, challenging, and suggestive. The emphasis upon the biographical aspect, the unusually fine maps, the accounts of Indian leaders and problems, the dramatic and readable descriptions of key battles, for example, Point Pleasant, Bushy Run, and the British capture of Fort Niagara, all make this an outstanding volume. Perhaps most noteworthy of all is the emphasis upon the development of a way of thinking and living, the evolution of a "Frontier People," who were to make possible the expansion of the United States. There are minor slips that will annoy scholars, but there are few of them. This is, as Professor Billington suggests in the brief Foreword, a really outstanding monograph, one that reveals "something of the majesty of the westward movement of the American people as they grappled to win and hold the first great West beyond the Appalachians."

RALPH ADAMS BROWN

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CHARLES P. WHITTEMORE. *A General of the Revolution: John Sullivan of New Hampshire.* Pp. viii, 317. New York: Columbia University Press, 1961. $6.00.

In *Revolution '76,* John Hyde Preston asserted that Washington could count on but four men for large independent command; Sullivan, Greene, Wayne, and Arnold made up the quartet. Brave, energetic, resourceful, the fiery Sullivan brought to his army post a keen desire to be of service, and he was, though plagued by bad luck. He was at his worst at Long Island, where his men precipately flew from the left, their naive commander admitting, "General Howe was too old for us," and at Brandywine, where he became the explanation for rout, Thomas Burke calling him "the Marplot of our Army." At Trenton, where they cleared the streets "in the twinkling of an eye," and at Princeton, where the jubilant Sullivan's men chased the British into the college yard, he was an able soldier.

He was at his best during the retreat from Canada, in organizing the offense at Rhode Island, and in conducting the campaign against the Six Nations in New York State. Complete success, at times within his grasp, always eluded him. Ambition drove him unsparingly; yet he considered

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the well-being of his men at all times. He wished popularity, and on the whole gained it, but, unduly sensitive, he was often embroiled in controversies which could have been avoided. Often tactless, he was appreciative of civilian authority, and, at a time when many wavered, he knew his duty and threw himself wholeheartedly into the Revolutionary tussle. General Washington gained a devoted, loyal, and hard-working lieutenant from the northernmost colony: "My Publick & Constant Declarations have been, & I now repeat, that in my opinion, you are the Saviour of this Country, And that to your fortitude, bravery, & Steady Performance, do we owe the Independence & Freedom we Enjoy."

Sullivan was more than "A General of the Revolution." Mr. Whittemore's dissertation shows the full measure of the man and suggests that perhaps his most worthwhile contribution was in backing Robert Morris' financial plan after he had resigned his commission and returned to Congress in 1780. This reviewer was particularly impressed with Chapter XIV, "Battle for the Constitution," and its recognition that "the economic interpretation is too neat, too precise." With Sullivan in the van, the Federalist leaders conquered the field—Henry Knox writing, "Your friends attribute much of the success of the cause in your state to your unremitted exertions." He was a good lawyer, a member of the Cincinnati, and Grand Master of the New Hampshire Masonic Lodge; President Washington appointed him federal judge for the district of New Hampshire. While President of New Hampshire, John Sullivan's courage to face a crisis unflinchingly enabled law and order to gain the upper hand there once more. His father lived to be over a hundred, but the son, pitifully senile, died in his fifty-sixth year. His was an active life in trying times: "The swagger, the pomp, the conceit have vanished; his service to the young nation, his faith in its future, remain."

ELLIS A. JOHNSON

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JACK M. SOSIN. *Whitehall and the Wilderness: The Middle West in British Colonial Policy, 1760–1775.* Pp. xi, 307. Lincoln: University of Nebraska Press, 1961. $6.50.

The author in his Preface explains that the purpose of this study was to suggest some alternative ideas to those presented by the one he considers the authority in the field—Alvord in his *The Mississippi Valley in British Politics*—ideas based on sources to which Alvord did not have access. While he lists many who have owed their inspiration to that author, he sees in their works little to challenge Alvord's conception and interpretations. This is high praise from an author inclined to be critical. In the Bibliography at the end he says of one historian that his book is "at many points unsound," that his "other efforts in this field exhibit the same faults," and that books that follow him "must be used with caution." Oddly enough, this historian is Alvord himself, who loses altitude in passing from front to back of the book.

Sosin attaches more importance to the part played in the Revolution by the problem of western lands than do Gipson and Abernathy, for he maintains that "the fate of the first British Empire rested on whether the colonists would accept imperial regulations and the obligation of sharing the expense." While colonial protest to being taxed did force a retrenchment of expense and a revamping of policy, it did not cause the complete abandonment of the West, nor can it be said to have produced the independence movement. The Quebec Act he considers an important expression of British policy for the West. He calls it an honest attempt at an alternative method of imperial control in that region when the older colonies refused to carry their part of the burden of its maintenance.

In his conclusions, Sosin shows himself rather more interested in the larger issue of British policy toward the older colonies than in what his title suggests. He questions whether the commonwealth idea would have solved the problem of colonial relationship, for there was little evidence of co-operation among the colonies at the time, and he questions the ability of the leaders to devise a positive, constructive program. He also challenges the idea of many historians that the colonies were too mature to "remain within the framework of the British empire," for they showed themselves unable to accept necessary responsibilities and obligations as empire members. And they were no better later, after independence.

On the whole, this book is scholarly and interesting, though the author sometimes clogs the narrative, in the current style, with disputes with other authors, not always named, but recognizable. And he has occasionally been led astray by leaning on secondaries for points that turned out to be in error. In one place he called the Secretary of State the "regular" channel of correspondence with the colonies at the time of Grenville, yet orders in council of 1752 and 1761 state that it "be confined to and pass through but One Channel," the lords of trade "only," though an emergency matter of importance could be routed to the king through the secretary. Another error is the reversing of the captions on his two maps of the Indian reservation's the board of trade's and Fort Stanwix's boundary lines. Minor errors are calling Lauchlin MacLeane, Shelburne's secretary, Under Secretary of State, and Franklin's son William, Sir William.

VIOLA F. BARNES
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Mount Holyoke College

FELIX GILBERT. *To the Farewell Address: Ideas of Early American Foreign Policy.* Pp. vii, 173. Princeton, N. J.: Princeton University Press, 1961. $3.75.

Professor Felix Gilbert is one of the very few American scholars who have interested themselves in the eighteenth-century derivations of American ideas relative to international affairs. His contributions in this field, although not voluminous, are significant.

The present small volume is, in effect, a series of five studies which, though each is a separate essay, are bound together by the thread of ideas which runs through them all, some of the component strands of which have their beginnings in Europe, while others derive from the American experience. The first two of these essays have to do with early American "utopian" assumptions relative to international affairs and with English ideas borrowed by the Americans; the third and fourth are concerned with the formulation of an independent foreign policy by the American states during the Revolution; the fifth is a critical analysis of the portion of Washington's Farewell Address which was concerned with foreign relations. Two of these essays, the second and the third, have been published previously in slightly different form. The essays are followed by an appendix comparing the various drafts of the Farewell Address, a thoughtful bibliographical essay, and an index.

Professor Gilbert describes his book thus: "[The Farewell Address] reveals the basic issue of the American attitude toward foreign policy: the tension between Idealism and Realism. . . . Thus the history of the Farewell Address forms only part of a wider, endless, urgent problem. This study is an attempt to shed light on its beginnings."

In general, Professor Gilbert finds the idealistic element to be derived from American "assumptions" born of the colonial experiment; the realistic element, apparently, derives from the ideas borrowed—or learned—from Europe; and in the end it was the realistic ideas of the "doctrine of the interests of the state," "power politics," and the like that Hamilton wrote into the Farewell Address.

On balance, it appears that Professor Gilbert exaggerates the naivete, the ignorance, and the inexperience of the Americans and the decisive influence of ideas brought from Europe, while ignoring both the close and informed interest in international affairs exhibited by Americans of the eighteenth century and the ruggedly realistic, power-minded imperialism of the colonies, especially about the middle of that century. For example, it is probably not true that "the entire colonial experience made foreign policy particularly alien and repulsive to Americans" (p. 17). Again, when listing the sources of information relative to international affairs (p. 33), the author appears to ignore the fact that the colonial newspapers were constantly filled with amazingly accurate reports of international dealings and with essays on the subject drawn from English newspapers. Again, in the lengthy discussion of the influence of Thomas Paine's *Common Sense* upon American ideas on foreign policy—"for a long time, every utterance on foreign policy starts from Paine's words and echoes his thoughts" (p. 43)—Mr. Gilbert apparently does not know that every idea Paine expressed in this area had been formulated by Americans and printed in one or another of the American newspapers at least as early as 1770, years before Paine arrived in America. In similar fashion, Mr. Gilbert exaggerates the influence of Thomas Pownall's *A Memorial to the Sovereigns of Europe* (pp. 107–111).

As Mr. Gilbert, himself, says, "the adoption and acceptance of European ideas, at least in the field of foreign policy, was selective and creative rather than purely imitative" (p. 16). The fact that the Americans did borrow and use ideas that were often more articulately expressed in Europe with regard to non-American situations should not be allowed to obscure the fact that American foreign policy was born of the hard, experience-proven realities of American self-interest that dated from the earliest decades of the colonial experience. Furthermore, although the Continental Congress had to devise a machinery for the conduct of foreign relations, the basic policies laid down for the instruction of American agents abroad, far from representing a revolutionary abandonment of some "utopian" colonial ideal, actually represented a culmination, or a final formulation, of ideas relative to America's self-interest in international relations that had been growing in form and substance for over a century.

It is a question of emphasis. The critic may judge that Mr. Gilbert, with his great erudition in the history of European diplomatic ideas, has tended to overemphasize the foreign influence in American thought on international affairs and to underemphasize the indigenous. It is a learned, thoughtful, provocative, and highly valuable little book, for all that.

MAX SAVELLE

LAWRENCE A. CREMIN. *The Transformation of the School: Progressivism in American Education, 1876–1957.* Pp. xi, 353, xxiv. New York: Alfred A. Knopf, 1961. $5.50.

Lawrence A. Cremin's scholarly review of the history of the Progressive Education movement is one of the most valuable works ever to appear in the field of American educational history. This is a book which should help immeasurably all other students of the subject. The author's thoughtful and clearly written narrative is heavily documented from a wide variety of original sources. There is an excellent annotated bibliography, thirty pages long, which is a stimulating guide to the relevant literature of the period. There are, in addition, many perceptive thumbnail sketches of important figures in recent educational history, including not only the better-known persons, but also some who deserve to be better known.

Professor Cremin seeks throughout to relate his main theme to the general development of American thought and society. The earlier part of his book, which discusses the origins of the Progressive Education movement, places it squarely in the context of that general ferment of American reformism, humanitarianism, and progressivism which was the dominant note in the culture of the turn of the century. The second half of the work, which I feel is by all odds the stronger portion, reviews the reasons for the decline of Progressive Education after 1918 and its final demise as an organized movement following World War II. The author's principal thesis here is that progressivism in education decayed, not so much because of outside attacks, but as a result of internal contradictions and shortcomings of its own. It had wedded itself so closely to professionalism that it cut itself off from its vital sources in the broader Progressive movement. At the same time, some units of the movement developed into a veritable scientific cult while others abandoned realistic social criticism and courageous reform for an overly narrow, child-centered "adjustment" approach.

The present reviewer would in no way wish to take exception to the main conclusions reached by Professor Cremin. One might wish, however, that he had commented a little less gently on some of the more esoteric Progressivist experiments of the World War I period, which his own data reveal to be fuzzy-minded if not downright farcical. Nor is it entirely clear, from my point of view, that the principal difficulty with Deweyism in later years was, as the author suggests, that over-eager disciples misappropriated and distorted the master's views. Finally, one might well question Professor Cremin's assumption that the big problems which arose in the Progressive Education movement were of post-1918 vintage. Were these later "aberrations" of Progressive Education purely a phenomenon of more recent years or were they inherent in the movement from its inception?

These are questions, however, of emphasis and interpretation, and they take nothing away from Professor Cremin's truly remarkable achievement. As a review of the history of a significant American educational movement, as a penetrating analysis of an important phase of twentieth-century intellectual history, this volume represents a solid contribution to the literature of American history.

WILLIS RUDY

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State College
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JAMES HARVEY YOUNG. *The Toadstool Millionaires: A Social History of Patent Medicines in America Before Federal Regulation.* Pp. xii, 282. Princeton, N. J.: Princeton University Press, 1961. $6.00.

The name of this book derives from a statement by Oliver Wendell Holmes, who was referring to "the quack medicines that build palaces for the mushroom, say rather, the toadstool millionaires."

When Professor James Young was a student in history at the University of Illinois, he found early newspapers overwhelmed by the advertisements of proprietary medicines. Almost simultaneously with the arrival of the first immigrants from Europe early in the eighteenth century came the patent medicines of their mother countries. With American enterprise and ingenuity, the number and variety of such products grew. Eventually came the articles by Samuel Hopkins Adams—in Collier's—called "The Great American Fraud," which stimulated the passing of the first food and drugs act. Subsequent legislation has brought controls of composition, labels, and promotion which have greatly diminished the evil. Moreover, the tremendous progress of the drug industry in developing effective remedies has made more difficult the task of the promoter of pharmaceutical quackeries. The low standards of medical education have given way to medical schools of high standards. The charlatan of today prospers by the laying on of hands and the use of alleged electronic devices.

The patent medicines of the nineteenth century depended on a variety of ineffective ingredients dissolved in considerable quantities of alcohol or alcoholic liquors. These herbal concoctions derived from the mysterious powers alleged to be the possession of witches.

In this fascinating review of the evolution of medical quackery in America, Doctor Young does not limit himself to proprietary remedies but provides also a study of the growth of so-called eclectic herbal remedies and the eclectic school of medical practice which has disappeared. He recounts brilliantly the story of the medicine show. In his Epilogue, which is called "Half a Century Later," he gives a brief survey of the present scene. Today the principal quackeries are in remedies for reducing weight, fake cancer cures, and arthritis. When the cause, the method of prevention, and the method of cure are discovered, quackery rapidly diminishes. Since the causes of overweight are primarily psychologic, the opportunity for quackery in reducing remedies is unlimited.

Professor Young has written a soundly

documented historical picture with much humor and with a charm that may, perhaps unfortunately, be associated with records of rascality.

MORRIS FISHBEIN

ROBERT A. DAHL. *Who Governs?: Democracy and Power in an American City.* Pp. xii, 355. New Haven, Conn.: Yale University Press, 1961. $7.50.

This book represents a significant point of confluence of several streams of development in contemporary political science, or perhaps one should say social science, since one of the most intriguing aspects of this work is its use of sociological methods in political research. Although Dahl is critical of some recent attempts by sociologists to fathom the character of political power in the contemporary city, his criticism is mild and his alternative explanations are convincingly supported with sociological and political data. He limits his assertions to the city he studied (New Haven), but his general comments on pluralism fit many aspects of contemporary American politics. To state the essence of his case in an oversimplified way one could say that he tested and found inapplicable the proposition that a "power elite" rules New Haven. He is inclined to believe that a power elite did rule it in the past but finds no evidence that one does today. He found many elites, not a single dominating one.

Dahl's method of identifying the elite groups in the city was not "reputational" as in some of the "power structure" analyses; rather he focused on certain areas of policy and, by various observational means, compiled lists of persons who had been involved in measurable degree in decision-making in a policy area. His evidence indicated a series of elite groups who effectively dominated various areas of public policy such as education, nominations to public office, and urban renewal. There was, of course, some overlapping of names, particularly where public officials were concerned, but the extent of overlap was surprisingly small. To show that New Haven has a pluralistic politics without a single recognizable power elite is not to say that all cities are like New Haven, a point which Dahl not only concedes but emphasizes. Of greater importance is the fact that Dahl's methods of analysis are entirely different from those of the power elite school and that the methods he uses were devised, in part at least, to avoid what he deemed self-serving—in the sense that the questions necessarily demanded confirming responses—aspects of the power elite methodology. This book like its predecessors in community power analysis must be read in terms of its methodology, particularly so since it is a methodological point that underlies much of the difference between the two groups.

Quite apart from the community power debate, however, *Who Governs?* has signal importance. For one thing it represents another example of a trend away from the typically stilted approach to local government and politics. Instead of debating the presence or absence of bossism, the qualities and prospects of reforms, the relative merits of forms of local government, Dahl digs into operating realities. Particularly important are his analyses of ethnic group politics, his demonstration of enormous changes in the governmental operations of the city with a change of mayor, but in the absence of any change in the charter or structure of government, and some provocative insights into the connection between the consensus on democratic ideals that permeates American society and the stability of the political system.

Unhappily, limitations of space rule out commentary on these and other arguments of the book, but it probably is not too much to say that this volume will become a landmark of American political science even though it deals ostensibly with one city during a relatively brief period of time.

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HAROLD EIBERSON. *Sources for the Study of the New York Area.* With a Chapter on the Study of Population Distribution by Sidney Ditzion. (City College of New York, Institute of New York Area Studies, Monograph No. 5.) New York: City College Press, 1960. $3.75.

A celebrated novelist once observed that writing the simplest article or speech about New York City required almost as much research as a doctoral dissertation. What she meant was that the literature on the city was incredibly profuse and dispersed and that the serious researcher had little to guide him through the forest of books, articles, monographs, research reports, and documentary publications on the subject. Bibliographies in subject areas like political science or history, or specialized manuals covering particular aspects of community life—such as government or city planning—on a nationwide basis were apt to refer to the city only obliquely, usually quite inadequately. That is why this volume was needed so badly. This need was compounded when the City College decided to award graduate degrees in the New York Area Studies. It was the launching of the program of New York Area Studies, in fact, which provided the immediate impulse for preparing this handbook.

The book mentions hundreds of individual references, with enough detailed and thoughtful commentary to comprise capsule book reviews. No systematic effort, however, has been made to publish an exhaustive list. The goal is to "help others help themselves" by directing the reader to those publications, libraries, or institutions which can most readily offer the specialized information he needs. It would be difficult to find a more comprehensive array of bibliographies, guides, indexes, and check lists for any community than the one contained in this volume.

Although Eiberson and his collaborator, Ditzion—who compiled a chapter on population trends—have paid some attention to subject areas like history, biography, religion, and health, this manual concentrates largely on government, administration, population distribution, and the area's economic life. The stress is on the current and contemporary scene rather than the distant past. Outlying sections of the metropolitan area get some notice, but the focus is on the central city. This should not come as a surprise to anyone who has attempted to do research on areas like Rockland County.

Based on years of personal experience consulting with students of metropolitan affairs, this volume offers abundant evidence of its authors' expert knowledge in the area. Small errors of detail can be found by an expert in the field: the name of a bureau appears under its former rather than its present title or the authors have omitted the name of a specialized library. To dwell on such details, however, is to overlook the most significant fact about this volume—that Eiberson and Ditzion have made a significant contribution to serious scholarship in the area they survey. Their immediate purpose was to provide a handbook for students working for the master's degree in the City College's New York Area Studies. They have prepared an invaluable guide for all researchers in the nation's largest and most complex metropolitan area. It should stimulate research in metropolitan problems for years to come.

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ASIA AND THE NEAR EAST

ADRIAN C. MAYER. *Peasants in the Pacific: A Study of Fiji Indian Rural Society.* Pp. xiii, 202. Berkeley and Los Angeles: University of California Press, 1961. $6.00.

The history of the Indian community in Fiji begins in 1879, when the first indentured laborers from India were brought to the colony. Today the Indians number approximately 170,000 and form the largest single group in the Islands. Between 1879 and 1916, when the indenture system was abolished, 60,537 Indians arrived in Fiji, and the present population is composed largely of those who chose to remain in Fiji. In the total life of the colony, the Indians have come to play an increasingly important part. Its significance for the agricultural economy is brought out by the fact that the cultivation of sugar cane, on which the Islands depend for their chief export, is almost entirely in Indian hands.

Mayer is an English anthropologist with a background of field work in India. The present volume is based on research carried out in three Indian settlements: two on Viti Levu, and one on Vanua Levu. The chief aim of the book, as stated in the Introduction, is to "provide an account of the rural section of the Fiji Indian Community." An "analysis of the social structure forms the theme on which the descriptive material is based" (p. xi).

For those primarily interested in the Fiji Islands, the excellent chapters on "History and Patterns of Settlement," "Economic Activities," and "Contexts of Political Activity and Political Patterns in the Settlement" will be particularly useful. In two of the settlements studied, a majority of the farmers were cane-growers, tenants of the Colonial Sugar Refining (CSR) Company or "contractors," who also disposed of their crop through the Company. As Mayer shows, relationships with the CSR have been a determining factor in the development of the social, economic, and political life of these Indian cultivators.

The book also offers materials of value to those interested in the comparative study of Indians overseas in various parts of the world, and to students of immigrant groups in general. Although Mayer restricted the scope of his inquiry to one segment of the total population and its component institutions, he was always aware of the larger society of which the rural Indians are only a part. In the final chapter, "The Settlements and the Outside," we find answers to at least some of the questions which such an account as he has undertaken must raise: questions concerning the Indian community as a whole, the relations between Indians and Fijians, and the extent to which Indians have ceased to be Indian and have become Fijian—in the sense of becoming members of a new social system, conscious of and content with the new status.

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ROBERT M. MARSH. *The Mandarins: The Circulation of Elites in China, 1600–1900.* Pp. xvii, 300. Glencoe, Ill.: Free Press, 1961. $5.00.

In recent years the problem of social mobility in traditional Chinese society, particularly in regard to its bureaucratic elite, has received considerable attention from social historians. The standard road to social advancement in China lay in achieving the status of *shen-shih,* that is, a holder of an official literary degree usually obtained through competitive examinations or purchase.

Such status not only provided a person with certain legal privileges, such as exemption from corporal punishment, but permitted him to take further examinations leading to civil service appointments, the steppingstone to power and wealth. Thus research into the problem of social mobility in China has largely been concerned with determining the percentage of *shen-shih* who had come from non-*shen-shih* family backgrounds in contrast to those whose fathers, grandfathers, or other close relatives had previously risen to this status. Unfortunately, those studies dealing with the Ch'ing period have given estimates ranging all the way from 14 to 35 per cent, depending upon the type of material examined.

Robert Marsh has based his study on the biographies of 572 scholar officials presented in the well-known work *Eminent Chinese of the Ch'ing Period,* published under the editorship of Arthur Hummel in 1943–1944. In order to obtain a better view of the ebb and flow of mobility from 1590–1900, Marsh has divided the period into thirty-year spans. The resulting figures range from 16 to 46 per cent. In this range, a pattern evolves showing that the greatest amount of mobility seems to have occurred during the periods 1590–1649 and 1800–1900 at the end of the Ming and Ch'ing dynasties when they were in a state of turmoil and decline, while the least amount of mobility took place during the period 1680–1770 when the ruling Ch'ing dynasty appeared most stable and the country was largely at peace. This would seem to refute the view that one of the reasons for the decline of a dynasty was the increasing solidification of the bureaucracy under the domination of a few wealthy and powerful families or cliques which prevented the entrance of any new blood capable of effecting the needed administrative changes.

March also points out that most previous studies of social mobility have tended to deal more with the problem of recruitment into the elite than that of advancement of its members. The importance of distinguishing between these two phenomena is indicated by the fact that while officials recruited into the bureaucracy in the first place came mainly from the privileged strata, tended to receive the highest degrees earlier in life, and thus held high positions for longer periods, still the policy of promotion according to seniority tended to equalize the chances of advancement for men from both official and commoner families once they were in the bureaucracy. Thus he concludes that nepotism and other extrabureaucratic influences on advancement were not so extensive as many scholars have heretofore believed.

The great weakness of Marsh's work, as he himself admits, is his material. Whether or not a list of eminent men can be considered an objective sampling for the entire bureaucracy is highly questionable. Nevertheless, Robert Marsh has provided us with an extremely useful book. His comments on methodology and on previous researches in the field are of particular value, and his Appendix on "The Formal Hierarchy of the Ch'ing Bureaucracy" provides a handy reference guide to the Ch'ing official system.

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RICHARD HUGHES. *The Chinese Communes*. Pp. 90. Chester Springs, Pa.: Dufour Editions, 1961. $2.95.

The rapid transformation in 1958 of some 740,000 Chinese agricultural co-operatives into 26,000 people's communes comprising 120 million households was a radical social experiment aimed at surmounting the tremendous barriers to economic development in the countryside. After the first five-year plan's general success, China's Communist leaders confidently sought greater achievements through decentralization above and centralization below. The commune is the strategic unit in this reorganization, combining in its own sphere industry, agriculture, trade, culture, education, politics, and military affairs, and dealing with such problems as labor allocation, agricultural investment, and water and soil conservancy on a mass scale.

Given the great significance of the commune and the dearth of serious material on its activities, students of China and the interested layman eagerly welcome works throwing light on this basic institution. Richard Hughes' little book examines—in nontechnical terms—the origin, development, operations, and revisions of the commune system. An Australian journalist who has travelled extensively in China—the last time being in 1956–1957—and now works out of Hong Kong, Hughes presents in fragmentary fashion an uneven view of the evolving commune. From the commune's origin in Honan province in 1958, he projects a composite view based upon eye-witness reports and other sources; he describes, often in biased fashion, its structure and functions, raising questions regarding the Communist party's intentions and "tidying up" process, and finally evaluating, in more moderate tones, the commune's attainments and prospects. His final chapter is followed by an extremely useful appendix—a translation of a Chinese newspaper's description of a people's commune in Honan province in mid-1959.

In this little book the author fails to take full advantage of much rich material, and the result is disappointing. Certainly the publisher's claim that the book is "the first objective study" on the subject is even more extravagant than the author's claim to "logical consideration of the long-range economic and social consequences" of the communes. A wide range of materials necessary to an understanding of the communes is covered, but the lack of clear focus, relating facts about the communes to the fundamental problems of economic development, is likely to leave the uninformed reader confused. The frequent absence of clear-cut source citations and the

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author's failure to include either a bibliography or an index will frustrate those readers who wish to pursue the subject further and deeper.

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WILLARD RANGE. *Jawaharlal Nehru's World View: A Theory of International Relations.* Pp. ix, 139. Athens: University of Georgia Press, 1961. $3.50.

The title of this book will likely cause some confusion, since the term "world view" is generally used in the sense of *Weltanschauung.* The subtitle, however, indicates that this is a study of Jawaharlal Nehru's theory of international relations. In the concluding chapter the author states that Nehru has never developed a theory of international relations (p. 114). What, then, is the subject matter of pages 1 to 113? Essentially, the book is a discussion of the general ideas, values, and attitudes which have some bearing on Nehru's approach to international problems.

Unfortunately, these ideas, values, and attitudes are so general that any attempt to discover a coherent theory is doomed to failure. The author's chapter titles accurately reflect this generality and vagueness. Chapter Two is entitled "Rationalism," and here we are told that Nehru wants the world to shake off its fear complex and go about settling international disputes in a rational manner. Chapter Three, "Tolerance," describes Nehru's view that we live in a pluralistic world society, and that differing ideologies should learn to be tolerant of each other. Chapter Four is entitled "Enlightened Self-Interest," and discusses Nehru's conviction that in the long run the national interests of any state will be served only if there is due regard for the interests of the international community.

Chapter Five, "Welfare Statism," has very little to do with international relations. Chapter Six, "Methodology," describes Nehru's views concerning the methods states ought to use in their relations with each other—the peaceful approach, the rejection of military pacts, and frequent meetings of heads of government. Many of the things which Nehru has had to say on these subjects are sensible; many are vague platitudes frequently expressed by leaders of all nations and ideologies. None but the die-hard antineutralist would deny that, on the whole, India's role on the international scene has been a useful one as a moderating influence between the two blocs. However, it cannot be claimed that there is a "theory" behind this, and the attempt to describe general attitudes in terms of theory distorts the picture somewhat.

The language used by Professor Range in describing Nehru's objectives is extravagant and misleading. The author writes of "the reforms he is trying to bring about in the present inter-state system" (p. vii) and of "his reforming drive for a new and better civilization" (p. 16). We are told that "the major objective" of Nehru's foreign policy has been "to dissolve the psychosis of fear that for thousands of years has pervaded the atmosphere of international relations" (p. 27). Has Nehru really embarked on such grandiose projects as these? His own statements of objectives are much more modest.

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P. J. VATIKIOTIS. *The Egyptian Army in Politics: Pattern for New Nations?* Pp. xvi, 300. Bloomington: Indiana University Press, 1961. $7.95.

Why have the armies assumed the political command of so many new countries? As a case history of a concept of broad application, P. J. Vatikiotis analyzes the recent role of the Egyptian army. He refers to the emergence of numerous army leaders as charismatic political chiefs, first in the pioneering venture of Ataturk in Turkey, then in the thwarted attempt of Shah Reza Khan Pahlavi in Iran, and more recently in Egypt, Pakistan, and Sudan, Syria, and Lebanon.

The military's role is due to several

causes. There were no well-established middle classes in most of these countries, and the ruling groups of the so-called *effendis* and *pashas* lacked a nationwide social consciousness, while they had class cohesion. The parasitic features of the government were too pronounced. Military officers, on the other hand, were not contaminated by corruption, having had little to say in politics. The process of westernization, to which the new societies aspire in spite of their revolt against the West, has been facilitated by the training of the army leaders in occidental ways by the "imperialists."

Turning to the specific case of the Egyptian army, Dr. Vatikiotis makes it clear that President Gamel Abdel Nasser appears to be the first modern Egyptian leader who, with all his faults, is capable of thinking in terms of the interests of the common man, and not of the uncommon nabob. His "socialism" connotes a socially conscious elite to replace feudal allegiances. His tool in modernizing and strengthening his country is a corps of army officers of whom he is the uncontested leader: *"l'armée c'est moi."*

The author is not sure whether the "National Union" established by Nasser was a workable political tool or a propaganda device. Recent despatches indicate that President Nasser is about to dissolve the National Union Assembly and will turn to the formation of a committee to arrange for what he calls a "popular powers" congress, representing peasants, workers, and business and professional ranks, but will afford no voice to "reactionary millionaires." While this transformation is being effected, the answer to the author's question will have to remain in abeyance.

The Egyptian Army in Politics goes beyond the framework indicated by its title. It analyzes the background of the temporary union of Egypt and Syria in the United Arab Republic (U.A.R.) and intimates the diversity of interests of the two former regions. It also provides the reader with a solid body of information about the work of the Nasser regime.

Since the Egyptian army is the focus of this book, it would have been instructive to read about the influence of former German army officers on the military and civilian staff of President Nasser. There was a time when attempts were made in this country to represent Nasser as an Arab Hitler. It is clear from the account of Vatikiotis that he is not that. As to the role of the Soviets in the U.A.R., Nasser appears to be playing the small powers' successful politics of balance of power.

In view of the fact that there are so many writers wanting to establish their claim to scholarship by employing an orphic style, it is a pleasure to report that the author of this book uses a forthright style which it is a pleasure to read.

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BERNARD LEWIS. *The Emergence of Modern Turkey.* Pp. 511. New York: Oxford University Press, 1961. $7.70.

Professor Lewis has chosen the emergence of the Turkish Republic as the great theme of his latest study. Based on both Turkish and other sources, this is a work of profound interest as a history of the development of the Turkish people. It is a model study of the development of nationalism in the Near East and should be read because of its wider implications as well.

The study opens with the decline of the Ottoman Empire in the seventeenth and eighteenth centuries; traces the impact of the West; notes the roots of revolutionary change and reform in the nineteenth century; and then moves swiftly through the Union and Progress (1908), the advent of the Kemalist Republic, and the Republic after Mustapha Kemal. Part II traces in some detail four special aspects of the Turkish transformation: (1) the evolution of the corporate sense of identity and loyalty among the Turkish people; (2) changes in governmental theory and practice; (3) religious and cultural evolution; and (4) social and economic change. A final chapter attempts to draw conclusions relative to the Turkish revolution and its basic achievement.

Mr. Lewis well notes that, in the formal sense, the Turkish Revolution, which has been going on for nearly two centuries, began with the Young Turk revolt in 1908, and that it has had many ups and downs. In the light of the long past, he finds "much that gives encouragement for the future." The author points out that the social changes which preceded and accompanied the rise of democratic sentiments have continued, and stresses the Turkish qualities of "calm self-reliance, of responsibility, above all of civic courage," without which no attempt at democracy can succeed. Against these qualities, "the ancient habits of autocracy and acquiescence cannot indefinitely survive."

The volume contains a well-selected bibliography of works in Turkish and other languages which should serve as a guide for further research and study. It has some excellent illustrations of both the old and the new in Turkey, and there are three black-and-white maps portraying the Ottoman Empire in 1792 and 1908, and the Turkish Republic today. All students of the Near East and its pressing problems —or of modern Turkey—will find Professor Lewis' volume required reading. It is one of the very basic studies, and will, without doubt, become the standard work in the field.

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Turkey and the United Nations. (National Studies on International Organization.) Pp. ix, 228. New York: Manhattan Publishing Company, under the auspices of the Institute of International Relations, Ankara University, for the Carnegie Endowment for International Peace, 1961. $4.00.

This work is of twofold interest: (1) as a report on participation in the United Nations by one of its most respected "small" members, and (2) as a case study in member motivation and behavior.

Modern Turkey came into being by defeating occupying powers which were among the founding members of the League of Nations. Later it joined the League and worked for its aims, although aware of its faults. Such experience conditioned attitudes of officials, scholars, and journalists toward the Atlantic Charter, Dumbarton Oaks, Yalta, and San Francisco. There was anxiety, but not blind hope, that League weaknesses would be forestalled by drafters of the United Nations charter. Dismayed by the ratio of elective to permanent Security Council members, veto provisions, dimness of prospects for universal membership, and other shortcomings and cognizant of interpower disharmony, Turkey was pleased, nevertheless, to become a charter member, preferring imperfect co-operation to self-righteous isolation. What Turkey has done, including her glorious role in Korea, is recounted so factually and modestly that it sounds almost inconsequential. So closely has Turkish policy paralleled that of the United States that other summary may be omitted here.

"There are no small nations." These words of a Turkish graduate student, to the present reviewer, at Ann Arbor on VE Day, have been recalled frequently, especially while reading for this review. That Turk's affirmation is almost the theme of our book, a study concerned with spasmodic membership in the Council, need to increase its size, need to transfer more functions to the Assembly, and the desirability of Charter revision. "Small" nations—Turkey, at least—can explain some facts of life to the big.

However, size is not all. Repeatedly, the authors base Turkey's foreign policy on its National Pact. When proclaimed in 1920, the Pact was a summons to nationalistic action. Its don't-tread-on-me motif also reflected Wilson's Fourteen Points. The national integrity which Kemalist Turkey then sought by independent action has become, in principle, a United Nations collective-security function.

But the United Nations is so constituted that, as Turks in 1945 predicted, some states can frustrate it in this and other responsibilities. Hence, without diminishing its United Nations role, Turkey has cultivated all mutual-security opportunities. Our report on Turkey in the United Nations becomes a report on Turkey's alliances—a case study on how disappointed members of the United Nation's co-operative, instead of improving radically their "store," are taking their business elsewhere.

The Ankara University faculty committees which compiled, wrote, and evaluated this study have earned commendation for a painstaking job. Documentation from official and journalistic sources is ample; as the authors state, significant public-opinion polling is too undeveloped to be useful. Appearances of reticence may reflect the official status of authors and their work—or Turkish politeness. For example, they do not explain why Turkey, assertedly favoring universal membership, has voted with the United States on the China issue. Readers must learn elsewhere about the newspapers quoted, such as which one of those criticizing the Charter in 1945 had a new printing plant, presented by Germany during the war. It is unfortunate, in a reference work so full of proper names, that the publishers did not provide type for accurate spelling: for example, the Chairman of the authors is Ahmet Şükrü Esmer, not "Sukru." There are also errors not obviously typographical, as "Balkan Pact" for Baghdad Pact (p. ix), "Gulf of Izmir" for Gulf of Izmit (p. 13), and confusion on an anniversary date (p. 170).

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ANTHROPOLOGY AND SOCIOLOGY

THEODORA KROEBER. *Ishi in Two Worlds: A Biography of the Last Wild Indian in North America.* Pp. 255. Berkeley and Los Angeles: University of California Press, 1961. $5.95.

This book is a unique and vividly written account of the successive steps in the extinction of an aboriginal California people and what happened to the last survivor when he left his Stone Age world and became a resident of San Francisco in 1911. Ishi, born between 1860 and 1862, belonged to the Yahi branch of the Yana nation which, although probably numbering less than 3000, had occupied the Mount Lassen foothills of northern California for several thousand years. For more than a decade before his birth, the turmoil of events on the California gold-rush frontier set the stage for the later destruction of the Yana Indians. By 1865, in fact, only Ishi's triblet remained, and by 1872 it was thought that they were extinct too. In 1908, however, some surveyors stumbled on a tiny, carefully hidden village of three huts in the wilds of Deer Creek canyon. Ishi, a middle-aged man by this time, his paralyzed mother, his sister, and an old man were living there. The latter, assisted by Ishi's sister, escaped, and they were never seen again. The white men found his mother and left her unharmed, but looted the village. Ishi returned and managed to carry her away, but she soon died. From then until August 1911—when, fearful and emaciated, with no clothes except an old piece of canvas, worn poncho style over his shoulders, he stumbled into the corral of a slaughter house near Oroville—Ishi had been alone. The sheriff was called; Ishi was handcuffed and locked up—in a cell reserved for the insane—in the local jail.

Finding himself in the hands of his enemies and unable to speak a word of English, Ishi did not know that he was on the threshold of a new life and that he would soon be surrounded by a circle of warm and devoted friends. Two of these, Kroeber and Waterman, were anthropologists at the University of California, specialists in California ethnography; the third was a physician, Saxton Pope, who was attached to the University Medical School in San Francisco—next door to the Museum building where Ishi was destined to make his home. All of them were younger than Ishi: Kroeber and Pope in their mid-thirties, Waterman still in his twenties. Hearing of Ishi's capture, Kroeber immediately took steps to have Waterman visit him. They correctly judged him to be a Yana, and Waterman took along some vocabularies that were available. This was the first entering wedge in establishing intelligible communication. Ishi was released in Waterman's care and was lodged in the Museum in San Francisco where there were a resident caretaker and a room which other visiting Indians had used when they came to the city. Soon Ishi was given a job as assistant janitor and learned to endorse his wage checks by writing *Ishi,* the generic term for "man" in Yana. Kroeber gave him this name because he knew that there was a rigid Indian tabu on uttering one's own personal name; yet, for all sorts of practical reasons, a personal name was an immediate necessity. In fact, Ishi's aboriginal name was never discovered. He slowly learned English, but never commanded it. He learned to select food for himself in shops and cook it on a stove. His native language was studied by Edward Sapir; Pope gave him the free run of the hospital and learned archery from him, becoming an authority on the subject. Thousands of people came to the Museum to see him chip arrowheads, and he had to be protected from those with commercial interests who wished to exhibit him to a wider public. Ishi became, moreover, an intimate part of the lives of his anthropological friends; he visited their homes on week ends and for longer periods. In the summer of 1914, Kroeber, Waterman, and Pope accompanied him on a camping trip to the Yahi country. In this environment, Ishi gave himself over fully to this venture and became less reticent about his past. A great deal of new information was obtained, and pictures were taken of Ishi hunting, fishing, making fire, and the like. A fine album of these is to be found in the book.

Although apparently free from disease when living under aboriginal conditions, Ishi caught his first "common cold" shortly after arriving in San Francisco and later, pneumonia. In 1915 he contracted tuberculosis, and died on March 25, 1916. The author writes (p. 230) that he was "a living affirmation of the credo of the anthropologists that modern man—Homo sapiens—whether contemporary American Indian or Athenian Greek of Phidias' time, is quite simply and wholly human in his biology, in his capacity to learn new skills and new ways as a changed environment exposes him to them, in his power of abstract thought, and in his moral and ethical discriminations." It may be added that Ishi likewise exhibited personal characteristics which attracted people other than professional anthropologists and which did not stem from the curiosity aroused by his unique history.

A full bibliographical guide is provided to everything concerned with Ishi and the history of the Yana. Social scientists of all kinds, humanists, and laymen, too, will find the book delightful as well as informative.

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WILLIAM W. STEIN. *Hualcan: Life in the Highlands of Peru.* Pp. xxi, 383. Ithaca, N. Y.: Cornell University Press, 1961. $6.00.

ORLANDO FALS BORDA. *Campesinos de los Andes: Estudio sociológico de Saucío.* Monografías Sociológicas, Facultad de Sociología, No. 7. Pp. xxiii, 340. Bogotá, Columbia: Universidad Nacional, 1961. No price.

Campesinos de los Andes was originally published in English by the University of Florida Press (Gainsville, 1955) under the title *Peasant Society in the Columbian Andes: A Sociological Study of Saucío.* The Spanish edition has an additional preface addressed especially to a Columbian audience and apparently omits some of the more complex statistical tables; otherwise there is little difference between the two versions.

Saucío is a rural highland "neighborhood" (*vecindario*) about ninety miles north of Bogotá in the *municipio* of Chocontá. The population, originally Indian, is indistinguishable from that of most rural *mestizo* communities of the region. Culturally, little Indian influence remains. Saucío is situated on a paved highway which follows closely a major stone-paved road of pre-Columbian construction. The first automobile reached Saucío in 1905, the first train in 1929, the present modernized highway in 1931, and the first great industrial enterprise, the construction of a large dam at nearby Sisga, began in 1948.

Hualcan is more than twice the size of

Saucío, retains substantial Indian influence in its culture—including Quechua as the dominant speech—and a Colonial-Indian hierarchy of town officials subject to the *mestizo* government of the district of Carhuaz. Hualcan lacks a road, but from the district capital of Carhuaz truck transportation is available to other highland centers and to the coastal plantations.

In both communities, a substantial proportion of the household heads own land. Others are dependent upon rented land or wage labor. Few of the land owners in either community can avoid either contractual arrangements with haciendas, local wage labor, or more distant labor. In Hualcan the latter is mainly on coastal plantations; in Saucío during the period of study much outside labor was provided by the dam construction enterprise, which permitted continued living at home.

Hualcan is the more conservative community. Few people ever leave Hualcan permanently, nor do new families enter the community. Residents of Saucío do leave permanently, either as individuals or families, and new families enter the community. The *Hualcaíño* may use supplementary cash to raise his economic position in Hualcan. The emigrant from Saucío most frequently raises himself a step or two in the social scale of the external world. Most *Hualcaíños* who leave the town even temporarily are men; from Saucío more women emigrate than do men. Fals Borda further questions the presence of communications as a cause of the more progressive attitudes of the people of Saucío; rather he attributes the changing views and aspirations to the stimulation of the essentially industrial dam-building enterprise in the vicinity.

Differences in methodological approaches are of interest. The information from Saucío is well quantified but, except for the last three chapters, there are no people, only digits. Despite Fals Borda's wish to disprove the urban upper-class stereotypes of the rural peasant as brutish, unintelligent, and passive, general statements about character, personality traits, and habits for the most part are unsupported by case data. In contrast, even the simplest things at Hualcan are uncounted. Thus it is impossible to compare the two communities on such things as the percentage of renters or the percentage who work outside the towns. The report on Hualcan is perhaps too full of people and includes frequent undocumented "psychologizing" explaining how the culture meets or fails to meet postulated psychological needs.

Both books make clear—as do many other studies of rural Latin America—the rising expectations and the dissatisfaction with rural poverty and exploitation among rural Latin Americans, which sooner or later will reach explosive proportions as they have already in Mexico, Bolivia, and Cuba. Such books should be required reading for the tradition-minded elites of both Latin America and the United States.

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ELIOT FREIDSON. *Patients' Views of Medical Practice: A Study of Subscribers to a Prepaid Medical Plan in the Bronx.* Pp. 268. New York: Russell Sage Foundation, 1961. $3.75.

This book should be of great interest to those concerned with the sociology of occupations and the problems of organizing physicians' services. Very deftly, Freidson sets forth his conceptual framework, the method, and generalizations. One feels that his great sensitivity to social situations enables him to see and feel more than interview and statistical instruments would permit the ordinary sociologist. Freidson has deeply experienced the situation he analyzes.

Freidson analyzes patients' reactions to three types of medical practice: (1) the prevailing conventional fee-for-service and solo practice method, (2) a closed-panel group practice associated with an insurance plan, and (3) a demonstration project adding services of public health nurses and social workers to a closed-panel group practice, plus insurance, suffused with a philosophy of optimum care from all staff members.

Freidson delineates two major structures, the lay and the professional, "meshing," as he says, "at some points and failing to mesh, or clashing at others." Patients reported that they felt that physicians practicing as solo practitioners took more interest in them, but that medical care in group practice was of a higher "technical" quality. Overwhelmingly, however, the patients reported very favorable experiences with the demonstration project where deliberate attempts were made to give optimum care in terms of time, resources, and range of personnel.

Class differences were found to affect how physicians, nurses, and social workers were utilized. Upper-class patients were more likely to seek out various types of medical services and physicians than lower-class patients. Upper-class patients experienced a greater range of choice.

A useful observation for medical care organization was the classification of medical practices into dependent and independent categories and the consequences flowing from them. Group practice was classified as dependent and solo practitioners as independent—in that physicians in group practice became profession-oriented rather than patient-oriented and solo practitioners the reverse. Consequently, patients felt that independent practitioners were more accessible and under greater patient-control than physicians in group practice. On the other hand, the latter were more likely to be under colleague supervision and thus to maintain certain standards. Those interested in medical care organization are, therefore, not given an "answer," but are shown the consequences inherent in alternatives, all of which are "correct" depending on the objectives.

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LEON BRAMSON. *The Political Context of Sociology*. Pp. xi, 164. Princeton, N. J.: Princeton University Press, 1961. $4.00.

Like Nietzsche, Professor Bramson has decided to put into practice one of Stendhal's maxims and make his entrance into society by a duel. In the teeth of a hundred-year tradition of scientific sociology, Professor Bramson reduces its central preoccupations to alternative ideological responses to contrasting milieux. Moreover, at the conclusion of his analysis he proposes the formal abandonment of scientific sociology for normative theory construction or policy formation.

In Professor Bramson's opinion, sociology "has an anti-liberal twist" and arose as a critique of "the traditional liberal ideal of liberalism" (p. 16). In the nineteenth century, European sociology had two forms: a sociology of conservatism "emphasizing the persistence of institutions, equilibrium, social statics"—claimed to rest on "natural laws"—and a sociology of change—Marxism. Both forms of sociology were concerned with the problem of order though they had different plans for it. In fact, "the preoccupation with social disorganization is continuous up to the present day and culminates in the European theory of mass society" (p. 26).

The theory of mass society is taken as a particularly vigorous, central theme of sociology. The larger part of Professor Bramson's analysis is concerned with its development in Europe and America. In Europe the theory of mass society is visualized as a set of ideological formulations by the political Right and Left directed against the liberal center. The theory is traced from Marxism, Hegelianism, romanticism, and French conservatism through many classical sociologists—Tonnies, Maine, Simmel, Durkheim, and Weber—to recent representatives of the Right and Left—Mannheim, Hannah Arendt, Ortega y Gasset, and Emil Lederer. It is argued that thinkers of both Left and Right share a view of mass society—including elitism and antiliberalism which disguise value judgments as facts (pp. 43–44).

In contrast, nineteenth-century American sociology was liberal (p. 21, 73 ff); hence when European sociological theories—such as those concerning the crowd (p. 64)—migrated to America they suffered a sea change. And when European theories of the mass society were consciously transferred to this hemisphere they aroused semiconscious opposition which led, for example, to the rediscovery of the primary group in the fields of mass communication and industry—where the mass theorists had seen only the most devastating destruction of traditional individual significance. "The theorists of mass society would interpret this undeniably 'empirical' evidence as indicating the loss of social ties . . . the liberal sociologist would interpret the same data as indicating the new potentialities for a creative individual life" (p. 118). However, whether approached in its intra-or inter-continental tensions, sociology is marked by the fact that "the Left and Right are united against the liberal-individualism of the center" (p. 122).

Professor Bramson concludes his examination of the ideological dimensions of European and American sociology with a forthright argument for subjectivity in social research. "Values," he observes, "are functional for social scientists just as they are for the people whom social scientists study. . . . A 'pure science' of the type which sociologists, clinging to Newtonian imagery, imagine to be carried on by the physicists, is hardly possible in the social sciences, nor is it even desirable" (p. 149). He makes a plea, not for eliminating value preferences, but for making them public.

A powerful tendency runs through this study to reduce sociological theories to sets of arguments for—usually disguised—values. Carried to its logical conclusion, this practice reduces sociology to a war of alternative ideologies at the expense of a scientific sociology which has been developing, however humbly, for nearly a hundred years. In contrast to an ideology which argues for or against a value program, a scientific sociology aims only to explain the facts of social life apart from all personal or political preference. A scientific sociology can advance only if each exposé of hidden ideological motives wins a new area for the value-free study of social life even if this area consists, in part, of the valuations of people. The conversion of all sociology into a purely normative discipline is to abandon the ideal of a scientific sociology. This is quite different from turning sociology to the task of self-conscious normative theory construction, that is into a public tournament of ideological duels.

However, apart from such considerations, in part because of them, Professor Bramson has performed a signal service. He has lifted to conscious attention an enormous mass of the unconscious preferences that have tended to press the program of scientific sociology from its proper course. The book deserves wide and careful reading.

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JITSUICHI MASUOKA and PRESTON VALIEN (Eds.). *Race Relations: Problems and Theory.* (Essays in Honor of Robert E. Park.) Pp. x, 290. Chapel Hill: University of North Carolina Press, 1961. $6.00.

Robert E. Park's many admirers should be pleased at the appearance of a volume in his honor, prepared in large part by his colleagues and students. These admirers will be sharply disappointed at the generally low quality of the "essays." Thirteen of the nineteen papers were prepared for reading at the dedication of a building named in Park's honor at Fisk in 1955. Some of the original papers were subsequently revised, and another six were written especially for this volume.

Following an introductory paper by Charles S. Johnson, the remaining papers —which follow no obvious pattern of organization—fall into three major categories. Some are reviews of the "present state of . . ." variety of selected theoretical or substantive areas in race relations. Where they review a theoretical area they are frequently watered-down versions of statements their authors have made elsewhere. This is true, for example, of E. Franklin Frazier's remarks, entitled "Racial Problems in World Society," and Andrew Lind's observations on race relations in Hawaii. Papers by Masuoka, on race and urbanism in Africa; John Burma, on Mexican and Spanish Americans; Bingham Dai, on personality development in minorities; Vivian Henderson, on economic aspects of race relations; and Herman Long, on community self-surveys, are either thin surveys of areas more economically treated in good race relations texts—Burma, Dai, Henderson and Long—or are based on secondary and even tertiary sources—Masuoka.

A second group of papers, more in the tradition of the man memorialized, attempt to state theory—or possibilities for theory or method. The papers of Robert Redfield, on primitive and civilized race relations; of Everett C. Hughes, on racial frontiers; of Guy B. Johnson, on race conflict and racial movements in the South; and of Edgar T. Thompson, on language and race relations, show an intellectual sympathy with Park, and extend or clarify some of his work. Attempts by Herbert Blumer—prejudice as a sense of position; by Inez Adams—values, status and social issues; and by W. F. Ogburn—social change and race relations—fail to produce contributions of equivalent value.

Papers by Guy Johnson, by Preston Valien—on the Montgomery bus strike—and by Leslie W. Jones—on disfranchisement in Tuskegee—would be much more valuable had more extensive treatments not previously appeared elsewhere. During a time in which changes in race relations have been occurring at an accelerating pace, a lapse of six years between the start and completion of a book sharply reduces its value. It will be noted that four of the more senior authors are no longer living.

Many of the papers have polemic overtones. Several writers seem to be oversimplifying—for example, E. W. Burgess and Samuel Stouffer. Perhaps the generally weak quality of these papers results from the fact that they were prepared for public presentation to a lay audience. If this is so, we now know that this is not the way to produce a solid memorial volume. This disappointed admirer of Park concluded that the book does little honor to Park's memory.

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FRANK F. LEE. *Negro and White in Connecticut Town.* Pp. 207. New York: Bookman Associates, 1961. $5.00.

There are those who say that sociology is the study of the obvious. *Negro and White in Connecticut Town* by Frank F. Lee may qualify as a study of the obvious. Perhaps any educated American who rips off his blinders will readily recognize that, with appropriate modifications for size and institutional elaboration, we have a description of "The North." Nonetheless, this very readable small book should be considered a contribution to the study of "social conformity" and "social control."

The findings: There is a relatively stable system of segregation in employment, housing, some types of recreation, most organized religions, and most voluntary associations. There seems to be no segregation in the schools. Racial prejudice seems to be endemic in many types of social relationships. There are exceptions based on particularistic criteria. There are also exceptions based on successful appeals to power structures and norms which transcend the local community. Generally, however, whites and negroes create and support the relatively stable system of segregation through their daily patterns of interaction and through the complex learning process which we call "socialization." Strangers occasionally violate the system of segregation either because they do not know its local cues or because they use this opportunity to ignore it. However, strangers do not fundamentally disturb the situation because they are defined as exceptions and hence are regarded as impermissible models for those who "must live in the community."

From a larger theoretical point of view, this study would seem to be a special case of the proposition that one function of the behavior of those who participate in a stable social system is to support—and hence to perpetuate—the system. Another special case of the general proposition is that which can be derived from studies of enclosed communities such as modern prisons and modern mental hospitals: modern prisons—and mental hospitals—continue to exist as stable social systems primarily because the prisoners—and patients—co-operate.

As the negroes of Connecticut Town have become more educated they have begun to recognize the validity of this proposition. There would seem to be three alternatives which are available to them: they can migrate to another community; they can accept the system as they find it; or they can reject the enforced segregation by the whites and their own correlative self-segregation, struggle for new patterns of interaction, and establish new attitudes during the course of the socialization of their children. One would hope that there will be some research which will ultimately lead to an ability to predict who will choose which of these alternatives and under what conditions.

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MILTON R. KONVITZ. *A Century of Civil Rights.* With a Study of State Law Against Discrimination by Theodore Leskes. Pp. viii, 293. New York: Columbia University Press, 1961. $6.00.

One of the most controversial issues in American politics today concerns the means available to overcome Southern resistance to the national enforcement of civil rights legislation. Professor Konvitz examines the history of Federal civil rights legislation and Federal court decisions to explain how it is that the United States is still struggling to establish the civil rights of negroes a century after the abolition of slavery.

It is the Southern conviction about race which gives a key to the history of civil rights and also an insight into present Southern attitudes toward the problem of civil rights. Professor Konvitz believes that nowhere in the world or in history did other peoples share the Southern conviction about the social origins of slavery. Only in the South was slavery conceived of as a permanent racial arrangement. In the rest of the world, slavery was conceived of as a temporary economic arrangement destined eventually to be replaced by new forms of capital and labor. But the South never changed its views, for even today the determined resistance of the South to outside action on civil rights is based upon the conviction that the negro belongs to an inferior species. The South continues to believe that the negro is incapable of freedom. Professor Konvitz insists that on the strength of this conviction the South has acted in "total nakedness" to establish the Black Codes, nullify Reconstruction, perpetuate the Solid South, and resist outside interference. Thus the South has opposed and continues to oppose the will of the nation expressed nearly a century ago.

Professor Konvitz seems to think that the burden of guilt in the history of civil rights must be borne by the South alone. He argues that it is irrelevant to conclude that the North is involved in this guilt because it also practices discrimination. For him, the verdict is determined by the persistence and magnitude of the South's actions. But it is difficult to accept this argument in the face of the facts that the North fostered racial prejudice and discrimination and that there were many persons in the North who resisted national laws because they felt that although the Negro might be a freedman, he certainly was not a free man.

Mr. Leskes' contribution to the book is an account of recent legislation in the northern states against discrimination in public accommodations, employment practices, schools, and housing. While the record of civil rights in the North can still be improved, the general conclusion of this section is that there has been some progress within the last decade.

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CHARLES E. WYNES. *Race Relations in Virginia, 1870–1902.* Pp. ix, 164. Charlottesville: University of Virginia Press, 1961. $5.00.

This book was conceived to test the C. Vann Woodward thesis, as set forth in his

Strange Career of Jim Crow, that the South's treatment of the negro in the two decades immediately following the Civil War was less restrictive than it was to become during the turn-of-the-century years. Struck by its bold originality, Professor Wynes decided to see whether the Woodward point of view would hold true for Virginia. He found that it did, in the main. In reaching this conclusion, Wynes has produced a work that will stand up in its own right as a scholarly appraisal of negro-white relations in postwar Virginia.

In the quarter of a century following Virginia's readmission to the Union in January 1870, the negro was "the most important factor in a turbulent period of social and political upheaval." But the colored man, more often than not, was the object, rather than the executor, of policies and programs. In politics the primary role of the negro was that of an issue. Except possibly for the four-year period when the Readjusters, led by the liberal Governor William Mahone, were in office, the negro voter wielded little influence. When, in 1888, John Mercer Langston, the erudite Oberlin-trained son of a freed slave, won election to the national House of Representatives, his seat was contested, and he was late in taking the oath of office for his lone term. But even though the negro posed little threat at the polls, candidates for office found it good politics to raise the bugbear of black dominance, arousing antinegro sentiment even among whites who seldom saw anyone with a dark skin.

Similarly, the specter of social equality between the races became a stock in trade for the politician. Prior to 1900 the negro might sit side-by-side with whites in railroad cars; but he was not admitted at inns and hotels, and in public entertainment he was jim-crowed, except at small-town circuses and carnivals. But although the negro was hardly in a position to challenge the social *status quo,* a railroad segregation statute was passed in 1900, just as a disfranchisement clause was written into the constitution two years later. Professor Wynes's well-rounded, carefully documented study throws much light on the Old Dominion today, giving us an understanding, for example, of how it came to pass that in Virginia the fight to keep the negro in a subordinate role was led, as it is at present, not by any wool-hat crowd, but by "men of good family and social prestige."

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JOSEPH A. WYTRWAL. *America's Polish Heritage: A Social History of the Poles in America.* Pp. xxxi, 350. Detroit: Endurance Press, 1961. $6.50.

Although this book is described as "a social history of the Poles in America," it is not a continuous historical narrative. Some important periods in the history of the Polish-Americans, for example, the period of the World War I, are not covered at all, while the narrative itself is interrupted in the very middle by a nonhistorical account of "the contributions of two American Polish organizations to the development of the Polish immigrants in America."

The book consists of an introduction, a short chapter on the history of Poland, four chapters dealing with the history of the Polish immigration to this country and its political and economic causes, four chapters describing the aims and activities of some Polish-American fraternal organizations, two chapters devoted to the ideological orientations of the Polish-Americans since World War I, and one chapter on their cultural and intellectual activities.

In the Introduction, the author attempts to provide some theoretical framework for the analysis of such phenomena as immigration, culture contact, and assimilation, and to give a survey of the more significant contributions to the history of the Poles in America. The theoretical discussion shows that the author's acquaintance with appropriate literature is both limited and superficial, while his survey of the Polish-American historiography is neither judicious nor quite fair to his predecessors. The chapter on the history of Poland represents popularization at its worst. It is burdened with detail and contains many errors.

The history of immigration is divided into three periods: 1608–1776, 1776–1870, and 1870–1929. It is based on the research of such pioneers in this field as the late Miecislaus Haiman and provides a useful summary of the findings of numerous, mostly unpublished, recent dissertations and theses on Polish-American topics. Unfortunately, it is rather narrowly biographical in orientation and overloaded with long and meaningless lists of names. The choice of the year 1929 as the closing date for the third period is surprising, but it is left unexplained. The discussion of the causes of Polish emigration to America is more original and interesting.

The attempt to analyze the activities of some Polish-American organizations is vitiated by the author's fragmentary approach to the problems of the Polish-American community, as well as by his obvious inability to use either a sociological or a socio-anthropological theoretical framework. The history of ideological evolution of the Polish ethnic group in America is interesting, but somewhat out of focus due to the author's surprising decision not to discuss the period of World War I. Also his treatment of the period of World War II is rather sketchy.

Taken as a whole, the book is poorly organized and replete with footnotes which frequently impress the reader as corrections or afterthoughts rather than as an integral part of the text. The Bibliography is long and ranges widely, but is neither complete nor arranged in such a fashion as to make it really useful. The Appendices contain some interesting statistics, but these are derived almost entirely from secondary sources. There are also conflicting statistical data within the text itself, and the spelling of Polish names and surnames is devoid of any consistency.

If the more serious of these deficiencies could be corrected in the next edition, the book might serve a useful purpose as a popular account of the history of Polish ethnic group in America.

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STEUART HENDERSON BRITT. *The Spenders.* Pp. x, 293. New York: McGraw-Hill Book Company, 1960. $4.00.

The Spenders is a discursive, repetitious account of the way people in the United States spend their money, plus a repeated effort, beginning with the front flap of the cover, to assure the reader that he is never—or hardly ever—bamboozled by advertisers or advertising into buying what he may not need, or what he cannot help buying, because of changes in fads over which he has no control.

Based upon interviews in the middle 1950's with many individuals and families and written with the assistance of a number of business and advertising executives, the major portion of the book is comprised of reports and opinions which were collected about such topics as "why consumers buy the products they do, what chances of success products have, what brand images and packaging mean to the consumer . . . what stores are like psychologically, and how prices affect buying." Some 10,000 American households were involved in the interviews at a cost of about two million dollars. Over eighty business and advertising executives, among a few others, are listed by the author as having assisted him in the preparation of the narrative. This part of the book throws interesting sidelights on the spending habits of the American people, on neglected areas that business men might find it profitable to cultivate, and on changing trends—such as the growing importance of women at all levels of spending.

Other portions of the book, however, have a different objective, namely, to persuade the reader that advertisers and markets offer only that which the consumer wants anyhow; that he is "king"; and, despite the fact that the consumer is largely a creature of emulation and habit, that he is nevertheless "completely free" to make any choice he pleases—is never "taken advantage of" or "made to want" what the advertiser wants him to want (p. 234). In illustration—according to the author—what you "really wanted" while driving your car at night, was "red-eyed monsters" with huge tail fins blinding you from their rear, while similar monsters "looking like

ESSAYS ON THE SCIENTIFIC STUDY OF POLITICS

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small-sized ferry boats" came at you "gnashing their teeth" from in front (p. 26). Also, he asks, what if we are too gadget conscious? "The sale of gadgets spurs our economy. . . . If it makes some of us feel better to have lots of chrome on our automobiles, aren't we just being human? . . . 'You're only alive once. You might as well be all alive instead of just half alive'" (pp. 33–34).

The character and quality of these ex cathedra assertions may be further illustrated. For one thing, they are generally contradicted in the business success stories also included in *The Spenders.* For example, in his discussion of the hula hoop (pp. 63–64), the author submits that it did not "become a fad just because youngsters wanted to play with hula hoops," nor because parents suddenly got over "objecting to the hip swinging, wiggles, and belly gyrations of Elvis Presley" and became possessed with a spontaneous want to see their own children "engage in navel maneuvers with hula hoops." On the contrary, the author continues, a "tremendous TV spot campaign" was put on, along with "person-to-person" publicity and related campaigns all over the United States—all obviously designed to create the craze that swept the country and transferred millions of dollars to the pockets of its contrivers.

In addition, no direct mention is made of the two most pertinent recent books—or of their authors—presenting views and evidence in opposition to those advanced in *The Spenders.* These are *The Hidden Persuaders* by Vance Packard and *The Affluent Society* by John K. Galbraith. One "exception," perhaps, might be noted, and that is the use of an aphorism about "the bland leading the bland" (p. 37), apparently lifted from *The Affluent Society* without benefit of quotation marks or credit to Galbraith.

With regard to advancing technology and economic growth, the challenge of recent books such as *The Waste Makers*—reviewed in the March 1961 issue of THE ANNALS—might have been appropriately touched upon in *The Spenders.* On this, however, the author merely states (p. viii) that his book "does not tell you how to get your money's worth for your dollar."

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ECONOMICS

NATIONAL BUREAU OF ECONOMIC RESEARCH. *Trends in the American Economy in the Nineteenth Century.* (Conference on Research in Income and Wealth, Studies in Income and Wealth, Vol. 24.) Pp. xi, 780. Princeton, N. J.: Princeton University Press, 1960. $15.00.

This enormous volume represents, in the words of the Introduction, "one of the most extended incursions made to date by economic statistics into the preserve of the economic historian." The papers are devoted mainly to a series of topics relevant to income analysis and measurement for the United States and Canada in the period 1840 to 1900. No final new income and product series are given, and the papers do not go far in examining the economic changes which produced the individual statistical series. Thus for both the income analyst and the economic historian much remains to be done. What the papers provide is an exploration of the statistical middle ground between the aggregate measures and the details of the historical record.

For the income statistician, the most constructive new work is provided in the opening paper by Robert E. Gallman. Here Shaw's work on commodity output is revised and pushed back from 1869 to 1839 on the basis of federal and state census materials. Apart from its intrinsic interest, the paper provides the hope that Kuznets' income series can now be pushed back to 1839 with appropriate estimates for the services sector. This step forward is balanced by a step backward; in a closely reasoned critical paper, William N. Parker and Franklee Whartenby destroy the validity of the only extant estimates for the period 1799–1869, the series of Robert F.

Martin. Kuznets had earlier cast doubt on the Martin series, but Parker and Whartenby complete the work of annihilation by dissolving also most of the inferences or statistics on which Kuznets' doubts were based. Parts II and III are devoted to seven papers on components of the income and output growth. A paper on farm product by Marvin Towne and Wayne Rasmussen endeavors to extend Strauss and Bean's series back to 1800, but from 1839 it represents little advance over Gallman's estimates, and before that date the series is based largely on population trends, assuming constant output per capita for major products.

Short papers on income originating in trade by Theodore F. Marburg and Harold Barger make use of Census data on number of establishments or employment, and estimates of turnover or rates of return. Paul B. Trescott supplements federal appropriations and expenditures data with materials from a number of sources to produce a solid and interesting series on United States government and national income, 1790–1860. Edward C. Budd offers a new look at W. I. King's estimates of factor shares, and revises King's series for agricultural wages and total income, but the interchange between the author and the discussant, Edward Denison, hardly leaves this difficult and important question in a satisfactory state. Anna Schwartz uses the Civil War income tax data and a number of other sources to produce estimates of dividend and interest payments at scattered bench-mark dates in the century. Stanley Lebergott examines wage trends in an extraordinarily interesting and discursive paper which, in the words of Albert Rees, its discussant, "inspires awe at what has been attempted, admiration for what has been achieved, and . . . some uneasiness about some of the results."

The papers mentioned above constitute direct contributions to the measurement of national income in the United States. The comprehensive re-examination of the balance of payments by Douglass North and Matthew Simon also contributes to this end, and will certainly become a standard reference. The paper by Ethel Hoover employs the data of the Weeks report (*Census of 1880,* Vol. XX) on retail prices to revise Mitchell's cost of living index and other series. Two papers, by E. R. Wicker and H. J. Cranmer on railroad and canal investment respectively, make a significant extension of the knowledge of the relevant quantities—railway mileage, expenditures on canals, and the like—in this area for the period before 1860. Richard A. Easterlin has the distinction of producing almost the only paper that makes interesting use of some of the available series to throw light on economic movements in the United States. In a paper on "Interregional Differences," he is able to compare the population and income positions of nine regions at 1840, 1880, and at most decade intervals after 1900. Increased divergence in per capita incomes between 1840 and 1880, due largely to the collapse of the South, is replaced by a growing convergence since that date, though the convergence between 1900 and 1940 was not particularly rapid.

In addition to the fifteen papers on the United States, the volume includes three papers and 110 pages examining the Canadian experience. A general view of Canada's economy from 1850 to 1900 by O. J. Firestone provides new estimates of value added by sector for 1851 and 1860, joined to Firestone's earlier estimates from 1867 on. The two papers on the Canadian balance of payments and trade by Penelope Hartland and O. J. Firestone complement each other well, since the first provides detail on invisibles and capital flow and the latter on the composition of commodity trade.

This volume has, then, an important use in the study of specific topics in American economic growth. "It is more likely," as William Parker writes with considerable insight in the Introduction, "that the statistics provided here will be used than that their misuse will be uniformly avoided." Surely, however, the scholarly apparatus to avoid misuse of the numerous partial and often shaky estimates is provided, and the amount of new information offered is prodigious. What lifts the book out of the class of reference works is the outline of a national income framework toward which so many of the papers contribute. It is encouraging to learn that the Income and Wealth Conference has authorized another conference in this area, to be held in September 1962, which promises not only to extend the statistics in the direction of income and product estimates but also to push the history in the direction of some examination of the changes in techniques, economic organization, and demand patterns which underlay this economic movement.

RICHARD RUGGLES

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J. FREDERIC DEWHURST, JOHN O. COPPOCK, P. LAMARTINE YATES, and ASSOCIATES. *Europe's Needs and Resources: Trends and Prospects in Eighteen Countries.* Pp. xxvi, 1198. New York: Twentieth Century Fund, 1961. $12.00.

This survey of the economy of western Europe is intended as a companion volume to the well-known book on America's needs and resources produced by the same authors. The "Europe" to which the new work refers consists of eighteen countries of western Europe corresponding closely to the membership of the Organization for European Economic Co-operation (O.E.E.C.); it includes all the non-Communist countries of the continent—but not Turkey. Although the individual countries are sometimes treated separately, the major emphasis is upon free Europe as a whole. After an initial chapter dealing with Europe's postwar recovery, the great bulk of the volume is given over to individual chapters dealing with "Europe's" resources—such as population, manpower, land, forests, energy sources, and minerals and metals—and needs—such as food, housing, education, health, and social security. The analysis is carried out in the framework of national accounting, and separate chapters on consumption levels, government expenditures and operations, investment, and foreign trade are included. Europe's needs and resources in these various broad and detailed sectors are projected to 1970. The authors estimate that output per manhour will rise by nearly 50 per cent between 1955 and 1970; owing to the net effect of a 10 per cent expansion in employment—population will rise 8 per cent—and a 6 per cent decline in average yearly hours of work, the growth in gross national product will be nearly 55 per cent. The extent of growth in gross product will, of course, vary around this average from one country to another; the authors think it will be close to 75 per cent in Italy and less than 40 per cent in the United Kingdom. Also, some sectors will grow much more rapidly than others; one rather nightmarish example of rapid expansion is the prospect of a near tripling of the number of four-wheeled motor vehicles on Europe's roads. The sources and data underlying these extrapolations are presented in 250 pages of appendices to the various chapters, placed at the end of the volume. An important conclusion that emerges from the extrapolation of Europe's needs and resources is that Europe is becoming more and more a "have not" area with respect to raw materials, and that its future will lie increasingly in fulfilling the role of a workshop for the less developed but raw-material-rich parts of the world.

In a somewhat different vein, though of equal if not greater interest, are chapters devoted to exchange and currency problems, Europe's underdeveloped areas, and European capitalism, productivity, technology, and economic integration.

The research resources that were used in the earlier study on America to assemble a historical record of needs and resources going back a half or full century had to be expended in the European study on geographical coverage. Although heavy reliance is placed upon the ready-made European data provided by the O.E.E.C., the authors have performed a major service in assembling materials from a wide variety of national sources to piece together a balanced and authoritative picture of a "Europe" that the integration movement is to an increasing degree making a meaningful political and economic concept.

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Growth in the British Economy: A Study of Economic Problems and Policies in Contemporary Britain. Pp. xii, 256.

New York: Oxford University Press for Political and Economic Planning (PEP), London, 1960. $4.08.

This book has no motto. Had one been provided, it could have very well been taken from the opening paragraph of the penultimate chapter—economic growth has failed because the British economy was not organized to grow. Reviewers cannot object that the message of a book does not become clear until the end, but it would in this case have been so much better had the last chapter of conclusions preceded the chapter with which the book begins, summarizing the contents of the chapters between.

Great Britain lacks resources to satisfy the claims, domestic and overseas, now falling upon us. We lack resources because our output is and has been insufficient. Increase of output depends on productivity. Our productivity is low both because investment is low and because it has been of the wrong kind. That is the thesis, and it is not one with which observers of the British scene would find much to disagree. The report considers the impact of the events and policies of the past ten or fifteen years upon investments promoting growth. These are taken under the several—chapter—heads of productivity, investment, and labor; public investment; pricing policy in nationalized industry; taxation; defense and the social services; and the balance of payments. Each of these chapters includes a statistical review, in so far as one can be provided, amplified by references to the record, many of which are not readily accessible to students not able to get at primary sources. There is discussion of the important questions raised by current policy and refutation—often of prejudices most commonly embraced. It is by man-power shortage that expansion of output is going to be impeded; and investment, such of it as there has been, has not encouraged the saving of labor. It is not true, as is often alleged, that the social services and the welfare state have between them increased consumption at the expense of saving; but of the claims of defense it can certainly be said that these have helped to aggravate the shortage of skilled labor. The prices of those products which are the output of the nationalized undertakings are all too often such that the costs of additional supplies exceed revenues from sales, but the reviewer simply does not believe that, for example, railway rates cannot be adjusted to costs because "marginal cost pricing would lead to heavy losses" (p. 94).

Investment in Great Britain has been too little, and capital has been spent on the wrong things. Agreed—but how to ensure that a greater proportion of income is saved, that the rate of investment is increased and capital laid down in the right physical forms? On those aspects of policy PEP is unsure; and these, for British statesmen and British economists, are the vital questions of the times.

This is a good book, however, with an index, and is to be recommended to those who want a compendium of such facts as are recorded in statistics, special and private, surveys, articles, and speeches on the recent economic history of Great Britain as it relates to output, productivity and investment.

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HARLAN L. MCCRACKEN. *Keynesian Economics in the Stream of Economic Thought.* Pp. xv, 201. Baton Rouge: Louisiana State University Press, 1961. $5.00.

This book examines the contribution to economics made by Lord Keynes in his *General Theory of Employment, Interest and Money* (1936). It concentrates on the purchasing-power-deficiency aspect of the Keynes theory, discusses its antecedents, and considers recent work which—in its author's words—has led to Keynesianism's "losing much of its luster."

Bearing in mind Mr. McCracken's emphasis, his inattention to such predecessors of Keynes in monetary theory as Misselden and Wicksell is understandable; but the Harrod-Domar thesis might have been given a place, asserting as it does that strict Keynesianism may find itself remedying present unemployment at the risk of creating more unemployment later.

Mr. McCracken seems unduly charitable to Malthus when that writer is credited with stating clearly the doctrine of high-wage-purchasing-power. Certainly, Malthus saw that increased wage payments, taken alone, could expand purchasing power; but he carried his argument only as far as advocating that the rich employ more menial servants, who were "unproductive" in Adam Smith's terminology. Malthus said that higher wages for "productive" workers, whose products were physical goods sold on markets, would raise production costs, reduce profits, lessen saving, and diminish the national product, so were not to be recommended. For good measure, he added that when such workers receive more wages, they may do less work. This hardly qualifies as a clear statement of the high-wage-purchasing-power theory as now understood.

This reviewer finds it difficult to credit either Commons or Keynes with discovering that capital values are derived through a discounting process from anticipated future incomes, as he was taught this in an elementary arithmetic class before the books of Commons and Keynes appeared. Mr. McCracken's Bibliography might well have included Mabel Timlin's *Keynesian Economics,* which helped many members of a generation of professors to give precision to the Keynes system.

On the positive side, the book contains an excellent chapter on Commons, viewed as a Keynes precursor. Evidently, this represents a labor of love on the part of Mr. McCracken. The concluding chapter evaluates very sensibly a number of the criticisms and modifications of Keynesianism which have been developed in recent years. The author's evident admiration of the Keynes contribution as a whole makes this chapter of potential usefulness to economists and others of the present generation whose enthusiasm for Keynes has led them to disparage, if not ignore, some of the recent work.

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F. A. LUTZ and D. C. HAGUE (Eds.). *The Theory of Capital.* Proceedings of a Conference held by the International Economic Association. Pp. xiii, 415. New York: St. Martin's Press, 1961. $12.00.

The theory of capital, which was thoroughly treated by the classical and neoclassical economists and then neglected for a time, has been revived in recent years in connection with the development of theories of economic growth. This renewed interest prompted the International Economic Association to devote its 1958 conference at Corfu to an examination of the position of the theory in modern economics. The aforementioned book contains the thirteen papers on different aspects of capital theory presented at the conference by the participating economists—all eminent for their learned contributions to economics. Professor F. A. Lutz of the University of Zürich, the chairman of the program committee, has written a useful Introduction, which puts the symposium in proper perspective and evaluates the main issues raised in the papers, while the principal editor, Professor D. C. Hague of the University of Sheffield, has prepared an invaluable summary record of the debates on the various papers.

The contributions to the symposium—most of them highly theoretical, in line with modern, model-building capital theory—are grouped in five parts. Opening with a paper by the Chairman on "The Essentials of Capital Theory," which is intended as a summary survey of the field, Part I devotes three other papers to a theoretical discussion of the problems of measuring capital and related aggregate concepts by Professors John R. Hicks, Paul A. Samuelson, and William Fellner. In Part II, Dr. Tibor Barna deals with the problem of capital measurement from the statistical side, and two additional papers present some evidence for the basis of a realistic and meaningful capital theory from the historical movement of over-all capital-output ratios and of capital-output ratios in different industries in the United States—Professor Evsey D. Domar—and in Germany—Professor Walther G. Hoffmann. Part III contains two contributions in microeconomics: one, by Professor Alain Barrère, dealing with the factors determining the combination of productive input in the individual firm, and, the other, by Professor Bjorn Thalberg, analyzing the effects of change of interest rate on investment in capital goods. In Part IV, Professors Nicholas Kaldor, David G. Champernowne and Robert M. Solow concern themselves with the theory of economic growth, and, finally, in Part V, Professor Jean Marchal discusses the reward of capital in the theory of distribution of national income.

Most of the contributions will be appreciated by economic theoreticians, but those by Lutz, Hicks, Fellner, Domar, Hoffmann and Marchal should also be welcomed by the general reader because they are interesting and instructive. They should be read in conjunction with the discussions which point up the many issues raised by the conference participants. The discussions are also noteworthy for two other reasons: they reveal lack of agreement among the economists on the different contributions and evince the gap that exists between the economic theorists and the statisticians. The latter complained that they got no "guiding rules" from the theorists in measuring the concepts with which they deal, while the theorists held out little hope for them to "live up to the exacting demands which their theories imposed." This led one discussant to remark that the degree of communication between these two groups of people seemed to be becoming less and less. It would appear, however, that the more appropriate contributions to measuring the different concepts are being made by the statisticians and the leading economic research institutions.

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The Economic Development of Venezuela. Report of a Mission Organized by the International Bank for Reconstruction and Development at the Request of the Government of Venezuela. Pp. xviii, 494. Baltimore: Johns Hopkins Press for the International Bank for Reconstruction and Development, 1961. $8.50.

The book under review contains one of the reports of the general survey missions of the World Bank, of which some fourteen others, devoted to countries in many parts of the world, are currently in print. These volumes constitute valuable case studies of economic development; indeed, for a number of countries they are virtually the only source of systematic information about, and reasoned analysis of, the country's economic problems. The economic survey mission to Venezuela, which was organized at the request of the Venezuelan Government, was led by Henry R. Labouisse, who later was to become head of the International Co-operation Administration of the United States Government. The international character of the mission is illustrated by the fact that its twelve members represented seven different nationalities.

The primary purpose of the mission was to make recommendations for a long-term development program, with particular reference to public investment. With this purpose in view, the report goes into a detailed examination of such key sectors of the Venezuelan economy as agriculture, manufacturing, transportation, electric power, telecommunications, education, housing, and health, pointing out the sources of strength and weakness in the economy. With the petroleum sector providing the basic stimulus for expansion, notable growth has occurred in the production of manufactures and of electric power, and in the provision of basic transportation facilities. The record was less satisfactory in agriculture, housing, and education. Furthermore, an examination of the distribution of the increased production of goods and services among various groups in the economy made the mission conclude that the benefits from economic progress "have been shared very inequitably" (p. 81).

In view of Venezuela's dependence on petroleum production and the uncertain outlook of the world petroleum industry, the mission suggests a continued reduction of the country's reliance on a single product, or, in positive terms, increased diversification of production. To bring about a better distribution of income, the mission recommends appropriate agricultural policies, as well as special efforts in the fields of education, health care, housing, and sanitation. The agricultural program reflects the dual nature of the Venezuelan farm economy, which contains a commercialized sector absorbing one-third of the farms side by side with a subsistence sector made up of the two-thirds of the farm families which operate less than five hectares. Measures suitable for the stimulation of production in the commercial sector offer little help to the subsistence sector. As there are large areas of publicly owned land which are undeveloped but suitable for agricultural use, help to the subsistence farmers might be forthcoming in the form of a resettlement program with adequate guidance and capital equipment for the new settlers. These and related matters are discussed in considerable detail in this workmanlike and thought-provoking study.

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C. K. YEARLY, JR. *Enterprise and Anthracite: Economics and Democracy in Schuylkill County, 1820–1875.* (The Johns Hopkins University Studies in History and Political Science, Series LXXIX, No. 1.) Pp. 254, ix. Baltimore: Johns Hopkins Press, 1961. $5.00.

This is a study of the evolution of the coal industry and the development by unincorporated, individual enterprises of the anthracite coal fields of Schuylkill County, Pennsylvania, during the first half of the nineteenth century. The construction of canals and railroads opened these coal fields to exploitation. From 1827 to 1857, the bountiful seams of the Schuylkill coal fields yielded more than half of the nation's total anthracite tonnage, and until 1867 more anthracite coal was produced from this county than from any similar coal county.

But even more important than its productivity was the fact that the anthracite coal fields of Schuylkill County were developed by small proprietors of private coal-mining. They refused to incorporate and clung tenaciously to their beliefs of democracy and the ideal of individual entrepreneurship. For nearly five decades the land proprietors and miners championed these forms of business enterprise while elsewhere the coal industry was controlled by incorporated mining or mine-carrying companies. But as deep mining developed, more capital was required for improved machinery, fortunes declined, and labor grew restless as wages dropped. Finally in the dark days of the middle seventies, the coal lands of the Schuylkill were bought up by the Philadelphia and Reading Railroad and came under corporate control.

The author has analyzed carefully, on the basis of research in manuscript and federal and state public documents, the factors which caused the decline and ultimate disappearance of this "way of life." There are good chapters on the impact of the development of the science of geology and on how mining methods depended upon a knowledge of the coal strata. But the speculative environment in Schuylkill; the tenacity of custom, ignorance, and indifference; and a shortage of capital worked against the usefulness of this information. The ineffective search of the operators for solutions to their problems and the organization of trade unions are analyzed. The author claims that the Molly Maguires were not as violent as history has made them out and claims that the reforms which might have been achieved were probably precluded less by economic factors than by the social attitude of the region toward corporate organization. This is an important study for students of economic and social history.

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PHILOSOPHY AND RELIGION

RUTH GRUBER (Ed.). *Science and the New Nations: Proceedings of the International Conference on Science in the Advancement of New States at Rehoveth, Israel.* Pp. xv, 314. New York: Basic Books, 1961. $6.50.

This volume carries the subtitle "Proceedings of the International Conference on Science in the Advancement of New States at Rehovoth, Israel." The conference opened on August 15, 1960 and was attended by delegates from fourteen African states, nine Asiatic states, and three South American states, as well as a bevy of experts of various sorts from the United States, Israel, and European countries. The Communist states were notably absent except for a representative from Yugoslavia.

The proceedings of any conference are apt to be an undigested and undigestible mixture of ingredients, of little interest to anyone except the participants. The present volume is an exception, probably partly because of the nature of the materials, but also surely because of the editorial skill of Ruth Gruber and the sponsors of the conference in arranging the material and in reducing the discussion to meaningful comment. The book remains an undigested hodgepodge—but therein lies its fascination. Within its covers are the brave hopes and plans of political leaders of the new states, the glittering technical promises for the future by some of the high priests of scientific progress, sober accounts of experiences by experts who have succeeded, and by some who have failed, cold appraisals of difficulties, and dreaming ignorance of realities.

Early in the book, P. M. S. Blackett of London underlines the difference between the $1000 and the $100 per-capita-income countries. This theme recurs again and again in looking at problems of energy, food, natural resources, water, health, economics, and education. Problems of population density and population growth are also a recurring theme and are the stated topic of one short section of the book. Education naturally gets attention at many points, especially in relation to the question of whether a new and poor state should try to develop "basic science" or should concentrate on training technicians to apply knowledge already available.

Many wise things are said by the conference participants. I particularly liked a short but clear and thoughtful essay by Arthur Lewis of University College, Jamaica, on the relations among science, men, and money in the problems of the new states. And toward the end of the book, Rolando Garcia of the University of Buenos Aires aptly cautions the leaders of the new states that the experience of Latin America shows that independence and progress do not necessarily have a cause-effect relationship. In general, the reader is impressed with the clear thinking of the contributors, which is encouraging. Yet I ended the book with a feeling of discouragement: partly because the size and complexity of the problems emerge so clearly, but partly also because the discussion was necessarily in terms of relations among nation-states and in terms of national aspirations. Politics, science, and nationalism form an unstable alliance, and one cannot help but wonder whether Africa will find the resolution of this easier than has Latin America.

MARSTON BATES

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MICHAEL BANTON (Ed.). *Darwinism and the Study of Society: A Centenary Symposium.* Pp. xx, 191. Chicago: Quadrangle Books, 1961. $5.00.

Compared with the three-volume symposium on Darwinism organized by the University of Chicago, this is a rather small work, but it is more interesting for a sociologist. The editor and contributors express the hope that sociologists may benefit "from a consideration of the lessons learned and the theories developed by their biological colleagues."

The theme of the essays is stated by J. Bronowski in the Introduction, namely, that the important issue raised by Darwin was not primarily natural selection—which the Social Darwinists assumed was manifest in such social phenomena as race and class struggle and on which they based their theories—but the question of the appearance of variations within a species. Werner Stark indicates in an essay entitled "Natural and Social Selection" that the inapplicability of these theories to the social reality of modern nations was recognized finally even by Ludwick Gumplowicz who was the "most brilliant votary" of Social Darwinism. Michael Banton, in his paper, "The Autonomy of Post-Darwinian Sociology," concludes that "Darwin in bringing order into biology led sociologists to try to develop their science along lines that proved unrewarding" and that "biological analogies cannot at present offer sociologists any intellectual shortcuts."

The other essays in this volume stress this view that biological concepts are insufficient to account for social phenomena. In a brilliant paper, "Social Mind and Animal Brain," B. Farrington points out that the human mind, which "we should regard as a novel, unpredictable, emergent phenomenon, connoting a new kind of activity on the part of man," and human language, which is "not merely a reflection of external reality but an agent in our intellectual apprehension of it" have enabled mankind to create a second nature that "is not merely, or even primarily, a material world but a mental one."

This symposium suggests two major lessons. The first is indicated in S. A. Barnett's article "Communication in Animal and Human Societies." "In man, for the most part, what is 'innate' is not any nervous organization for producing stereotyped movement patterns, but certain propensities and certain needs. . . . The controversies about 'instincts' can now be put aside. Instead we may turn to finding out more about the (social) needs, precisely defined, that we have in common, and the results of not satisfying them." Variants of this theme are developed in "The Human Evolutionary System" by C. H. Waddington and in "Social Norms and Social Evolution" by Tom Burns.

The second lesson is pointed out by J. Bronowski in the Introduction, namely, that sociologists need to look for "units of social variation which differentiate one group from another, one organization from another—perhaps one society from another—and which can be passed on in a stable manner."

This interesting book is enhanced by clear and understandable writing that is in the best British tradition.

THEODORE ABEL

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FRED L. POLAK. *The Image of the Future: Enlightening the Past, Orienting the Present, Forecasting the Future,* Vol. 1: *The Promised Land, Source of Living Culture;* Vol. 2: *Iconoclasm of the Images of the Future, Demolition of Culture.* (European Aspects: A Collection of Studies Relating to European Integration, Series A: Culture, No. 1.) Translated from the Dutch by Elise Boulding. Pp. 456; 376. New York: Oceana Publications under the auspices of the Council of Europe, 1961. $12.50 (2 vols.).

This profound study, massive in scholarship and felicitous in literary form, sets forth a novel approach to the problem of the rise and fall of civilizations. The author, a Dutch sociologist who received a United Nations Educational, Scientific and Cultural Organization (UNESCO) Fellowship in 1949 and spent a year (1954–1955) as a Fellow at the Center for Advanced Study in the Behavioral Sciences at Stanford, draws upon an abundant background of materials to show why all major systems of historical explanation are inadequate to the task. Having exhibited the reason for their incompleteness, it is then the author's undertaking to construct a new system which will repair the breakdown of previous interpretations of history.

According to Dr. Polak, theorists like Hegel, Spengler, Toynbee, Sorokin, and others regard time as flowing from the past to the present, and so they must extrapolate this time line into the future according to linear, spiral, or wavelike—dialectically broken—patterns. Whatever the schema, the movement of time is unidirectional: history is read from left to right. In this book it is proposed that we reverse the direction: "In order to reconstruct—or enlighten—the past, we should study the future."

This paradoxical conclusion is defended by the proposition that the possible future is in considerable part already visible today. It is foreshadowed in the people's chosen images of the future, the conceptions projected from the present and developed and imprinted in the course of history. According to the author, this introduction of the future as a reality in the historical process is no mystical revival of deterministic or apocalyptical ideas. Nevertheless, the "futuristic" study of the reigning images of Western culture allows a forecast of our own future as this is determined in advance by such foreshadowings. Thus the Western world can be freed from imprisonment in the present, and "man will once again move forward to meet his own vision of the future."

It is not possible to write a summary of this work of over eight hundred pages, or even to attempt a survey of the author's recapitulation of the cultural movements of nations and his résumés of alternative theories of those movements. Here one finds penetrating analyses of the dominant themes—from Hellas, Iran, Israel, medieval Christianity, the Renaissance and Reformation to the recent images projected by socialist utopian dreams, the motifs of psychoanalysis, and other "fake-images" offered by modern prophets of social change.

As for the future, we are told that the Western world is in a state of breakdown, and there is a general phobia concerning the future—"the future is a thing of the past." But the great question still remains: to be or not to be? Can the future be reborn? Unlike Spengler, the author is no pessimist: we are finished if we think we are, but we have a future if we are sensitive to the "magnetic pull of tomorrow." We yet have time to demonstrate that man's capacity to create and follow visions has not been lost.

Criticisms of this ambitious work are not difficult to conceive. In the first place, there is some kind of metaphysics implicit in this interpretation of history. This needs to be made explicit. Secondly, it is no longer possible—or at least desirable—for any nation or people to project an image of the future which is not a one-world synoptic vision, that is, an East-West complementarity. The author has not dealt with the Oriental contributions to the new image that must be created. Must not this monocular vision of the "image of the future" perforce become binocular, if it is to have depth to it—and if it is to be responsive to the magnetic pull?

OLIVER L. REISER

Professor of Philosophy
University of Pittsburgh

M. STANTON EVANS. *Revolt on the Campus.* Pp. vi, 248. Chicago: Henry Regnery Company, 1961. $4.50.

Himself an eminent product of the movement he describes, Mr. Evans, aged twenty-seven, already is editor of a big metropolitan daily, the Indianapolis *News.* His subject is the revival of conservative opinions among students at American universities and colleges, a topic now the theme of many articles in popular magazines and newspapers. To the current discussion, much of it uninformed, Mr. Evans brings a mass of fact.

In general, the conservative "revolt" closely parallels the recovery of initiative by conservatives among British university students in the late 1940's. Since that time, in Britain, conservative students have tended to dominate opinion; and now, in America, unquestionably the intellectual liveliness belongs to conservative college students, who have clubs on more than two hundred campuses, and publish a dozen journals of opinion. They are stronger in number and organization than were the conscious radicals on American campuses in the 1920's and 1930's—although, as Mr. Evans suggests, the mass of American students remain indifferent to political theory and conservative only in the sense of lethargy or conformity.

One interesting aspect of the movement which Mr. Evans does not discuss is the popularity of conservative doctrines among what, in Britain, are called "scholarship boys"—that is, young people of working-family origins. This is particularly true in the New York area. Also Mr. Evans fails to mention the first really active conservative society of this present ferment—the Yale Law School Conservative Club, founded in 1953.

By and large, the general ideas of these student conservatives are those of Edmund

Burke. Only a small minority subscribe to the egoism of Miss Ayn Rand and allied extreme individualists. The label "individualist," indeed, has given way among nearly all these students to "conservative." The movement also must be distinguished from the demagogic "right-wing" enthusiasm much discussed in the press nowadays, for—as was evident among the Students for Goldwater who appeared at the Republican Convention in 1960—these are, for the most part, well-read and articulate young people. A typical spokesman for them, Mr. Michael Uhlmann of Yale, declares that his conservatism, patterned upon Burke's, derives its sanction from "absolute standards of morality and of natural law, from which, in turn, the concept of dignity and worth of the human being is derived. . . . It is silly to speak of any type of morality unless man is a free agent, and thus the highest *political* goal becomes the preservation of individual liberties."

RUSSELL KIRK

Research Professor of Politics
Long Island University
Editor
The University Bookman

JOHN JOSEPH. *The Nestorians and Their Muslim Neighbors: A Study of Western Influence on Their Relations.* Pp. xv, 281. Princeton, N. J.: Princeton University Press, 1961. $6.00.

Here is an excellent piece of scholarship which makes interesting but sobering reading. As its title indicates, it has to do with the ancient Christian body usually known, inaccurately, as the Nestorians. In his informative discussion of the name, the author rightly points out that various appellations have been given them. He notes that the "Nestorians" prefer the designation Syrians, but have also been called the Church of the East, the Assyrians, and the Chaldeans. Their origin as a church goes back to the early centuries of the Christian era. A religious minority in the Sassanian Persian Empire, they were subject to distrust and at times to persecution because of their dissent from the official Zoroastrianism and because their loyalty was suspect during the chronic wars of that regime with the Roman Empire at the time that the latter became officially Christian. Under the Moslem-Arab rule which followed, they remained a minority under civil disabilities. But they spread widely and at times their communities were found, usually still as minorities, from Mesopotamia to the China Sea. They suffered severely under Tamerlane and later Moslem rulers, and by the nineteenth century were greatly reduced in numbers. Of many ethnic origins, they were held together by their ecclesiastical structure and their language, Syriac. They were then chiefly in central and southern Kurdistan and in Urmiyah—now Rezaieh—in Persia.

Dr. Joseph's study has chiefly to do with the manner in which this religious body was affected by missionary and political currents from Europe and the United States in the nineteenth and twentieth centuries. Several Christian churches—Roman Catholic, Anglican, Protestant, and Russian Orthodox—sent missionaries in the hope of bringing it to conform with one or another of their patterns. Each had some success, with a resulting fragmentation of the Syrian communities. Syrians were caught in the power politics of western Europe, Russia, Turkey, and—after World War I—Iraq. From time to time they were attacked by their neighbors, the Kurds. As a consequence they suffered a severe loss in members and were scattered farther geographically.

Based upon a doctoral dissertation, the book is well documented, largely from printed sources, and is as nearly objective as is to be expected in so controversial a subject.

KENNETH SCOTT LATOURETTE

Sterling Professor of Missions and
Oriental History, Emeritus
Yale University

JAMES M. GUSTAFSON. *Treasure in Earthen Vessels: The Church as a Human Community.* Pp. xi, 141. New York: Harper & Brothers, 1961. $3.50.

Properly to understand the church, writes Professor Gustafson, it should be viewed from two opposite standpoints. One of these is the theological view; the other is to interpret the church in terms of those same social processes that are also operative in other groupings. Each of these views of the church requires the other if we are to be intelligent and effective in serving the church. When theology of the church ignores the common social processes, we have what the author calls "theological reductionism"; when this is reversed and theology is excluded, we have "social reductionism." Each is condemned as misleading and insufficient. To rectify the prevalent theological reductionism, the author devotes himself to the social process that creates and sustains the church.

Like every other group that maintains its identity and unique purpose through history, the church has a distinctive language. This should not become esoteric; it should be communicable to the encompassing society. At the same time, this language should be Biblical in contrast to the language of other groups. In having a language of its own the church is like the nation or a scientific fellowship or the family.

To the same end the church has its objective symbols such as Bible, creeds, rites, offices; and these should carry a meaning to the members that they cannot have for those who have not internalized in depth—what these symbols can convey from past events into the present. When the church tries to maintain itself as a fellowship without its own language, symbols, and institutional structure, it begins to lose its character and purpose. In this respect it is like other fellowships that have a purpose to serve continuously through history. Like the nation the church must rehearse and relive those events that brought it into existence and give it the mission which it is designed to carry on. These events are recorded in the Bible and in church history and center in the story of Jesus. No group can rightly call itself a church, says the author, if it does not do this.

In the last chapter, Professor Gustafson faces the problem of how to understand the divine causality and religious meaning of social processes that "can be interpreted as if God did not exist." In sum, how can the theological be combined with the social interpretation of the church. This problem is not treated extensively except to say that the same identical process can be viewed as the presence and action of God as well as a social process subject to psychological and sociological explanation.

HENRY NELSON WIEMAN
Professor of Philosophy
Southern Illinois University

Letters to the Editor

SANTA MONICA, CALIFORNIA
January 2, 1962

Dear Sir:

For some years I have reviewed books on recent and contemporary affairs in THE ANNALS because, more than competing learned journals, its audience is concerned with current and future policy matters and tries to use factual information as a guide to practice. It has seemed to me that reviews in this journal should avoid a pedantic view of books; rather, the basic content and the principal messages and theses of books should be revealed and roundly criticized—if desired—as a first order of reviewer business.

Now comes a so-called review of my *Welfare in America* (University of Oklahoma Press) which tells nothing about the subject matter and consists entirely of a moralistic stricture on the alleged evils of daring to suggest policy changes within a book format. False statements also appear.

Totally disregarded is the declared purpose of the book. It is conspicuously the stated purpose of my fourteen separate essays "to bring into focus issues that have divided our people" and to suggest others "to which attention should be given without delay." The four-paragraph Preface describes the book as "an entirely independent evaluation" whose purpose is "to present little known facts, sharpen issues, and invite open discussion." Given this revelation of purpose, it is unpleasant, but not a slur, to say that a book contains "opinionated essays." The audience sought for the book was in any case declared to be "leaders in our communities who share my concern over the present and future welfare of all the people who comprise our society." Such an audience is obviously mature enough to read pages of commentary and opinion with discrimination.

The review's inaccuracies are many. (1) Never in my various books and articles have I called public welfare programs "give-away programs;" it follows that I cannot have done so "frequently" in *Welfare in America.* Such a sentiment is vitally contradictory to my fundamental beliefs on humanitarianism—which are scoffed at by the reviewer for unexplained reasons. (2) Nowhere does my prose refer to a "rising tide of 'socialist' measures," in those words or in any that resemble them. (3) Since an entire essay is devoted to a definition of "social welfare," with exclusions and inclusions, this fact might have been mentioned in connection with any charge about silence in my pages on frame of reference. (4) The reviewer, like many social work school instructors, bristles at my passing mention of obvious flaws in the Aid to Dependent Children (ADC) program. Additionally, he distorts the context in which the book mentions the existence of ADC families who get "two to four hundred dollars a month." That phrase appears as a supplementing point to a lead sentence that says, "Public aid has come a long way since the days when, under local poor laws, the person who was down and out could get a pittance from local government to avoid starvation." I referred to maxima, and there is not the slightest intimation that I intended to refer to "current average payments." However, I would like to attack the idea that such figures adequately reveal the nature of actual ADC family receipts in cash and services. Such averages are deflated by concurrent payments of social security, when present, and by deductions of income received from other sources. (In California, as I write, the November 1961 averages were, nevertheless, $156.00 plus an average of $15.00 in medical benefits!) To ADC receipts can be added prorated amounts for counseling and guidance, money management, vocational rehabilitation, and various other free or part-pay services received by those on public aid rolls. Also, ADC families contain more children than other families, as is well known. In summary, my very generalized maxima for, say, a southern state and an industrial state impress me as being conservative, especially if one adds in the concurrent receipt of supplementary payments in some instances from general relief funds or from other local government and voluntary sources.

In conclusion, I do not claim that *Welfare in America*—whose research and publication was financed by two foundations—is any better or more important than this ideologically antagonistic reviewer thinks it is. He need not have been in agreement with any of the views I expressed on the basis of five years of full-time research, and he was entitled to write a blistering rebuttal. But his review came dangerously close to being an attack on my person; its allegations have upset certain of my friends in various parts of the country. I have reluctantly chosen to try to set the record straight.

For those who are interested in the main subject matter of the book, it consists of motives for giving, problems in united fund-raising, trends in federal social security and public aid programs, the national health agencies, opportunities for voluntary welfare action by trade unions, dangers in fee-charging by voluntary agencies, aspects of the social work "profession," and current trends in what I call "The American Pattern in Social Welfare." (The review somehow omitted specific mention of what the book was about.)

VAUGHN BORNET

PITTSBURGH, PENNSYLVANIA,
February 7, 1962

Dear Sir:

After a careful perusal of Mr. Bornet's book, I feel that my original evaluation was sound. Selecting from the text any further illustrations of distortions or misrepresentations of the welfare scene in America would not help clarify the differences between the author and myself. It is not a question of the author's selection of "little known facts," it is rather a studious partializing of the evidence to present a predetermined point of view.

I must apologize for the terms "'give-away' programs" and "'socialist' measures," if I gave the impression that they are direct quotes. As Mr. Bornet points out, these terms do not appear in the volume. However, I used them because they provided the most accurate and succinct way of summing up the position which, I believe, Mr. Bornet's volume presents.

As I indicated in the last paragraph of my review, Mr. Bornet has recognized many sensitive areas of welfare policy. In fact, I personally share some of his beliefs, but the issue is not the extent of agreement of our opinions or prejudices. The issue for me, at least, is whether or not Mr. Bornet's book meets the usual criteria of validity and reliability. At this point I can only suggest that the general reader will have to determine for himself whether the book meets these standards.

Sincerely yours,

SAMUEL MENCHER

Professor of Public Welfare
and Social Work Research
University of Pittsburgh

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